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ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXIII. No. 3432 SEPTEMBER 3, 1943 6d. WEEKLY

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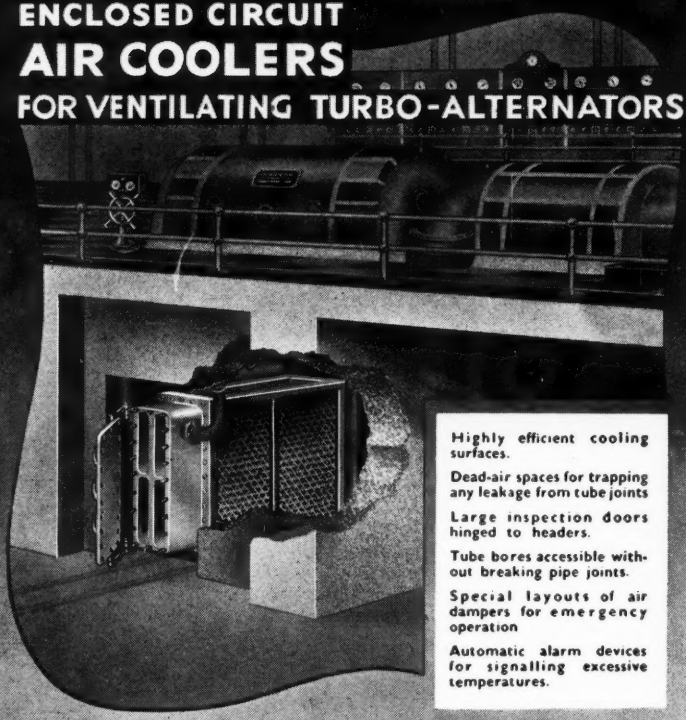

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ELECTRICAL REVIEW

September 3, 1943

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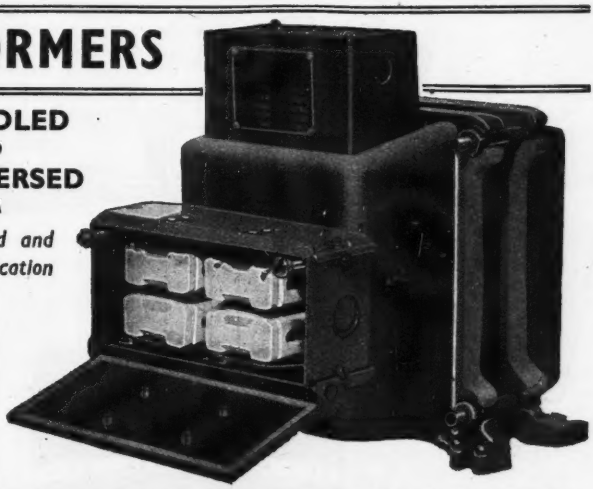

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THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXIII. No. 3432. SEPTEMBER 3, 1943 6d. WEEKLY

Public Ownership

Some Relevant Examples

RECENT comments by "Janus" in the *Gas Times* are a reminder that while the electrical industry sometimes feels that it is being picked on for some as yet unspecified treatment the gas people have their apprehensions too.

Proposals for reorganisation have been put forward within the industry but, according to "Janus," have secured far from unanimous support. This has a familiar sound to electrical ears. The gas industry, too, has had a demand from the Ministry of Fuel and Power to produce a scheme and our contemporary grumbles that the time allowed is too short and that there is really no hurry as nothing can be done until after the war. "A few months is not a long time in which to draw up plans acceptable to the diverse interests concerned—and the Minister." The warning is sounded that if no solution is forthcoming the Minister can produce his own by issuing Orders, which is a doubtful and undemocratic way of doing things.

Causes of Backwardness

"Janus" goes on to refer to a discussion of gas industry reorganisation at a meeting of the Halifax Corporation when the question of private *versus* public ownership inevitably cropped up. One speaker said that the backwardness of the gas industry was due to private enterprise. "Janus" says that those who know the industry will also know that such failings as there were, and are, in the industry are ascribable equally to both forms of ownership.

Talk of public ownership is dismissed as "a lot of nonsense" because in both cases capital is found by the public at large. This seems to be over-simplifying the matter, but many electrical people will certainly agree with the contention that the consumer is not much concerned about ownership "unless some pushing politician 'convinces' him of the benefits of 'public ownership'—translated, that means political control."

"Mixed" Ownership

This question of ownership is the principal stumbling block in the way of any electrical reorganisation on a national or regional basis. It is generally assumed that public ownership is imperative, but is that assumption necessarily correct? The 1919 Act allowed for the institution of "mixed" ownership in the form of Joint Electricity Authorities and the West Midlands J.E.A. is an example of this which seems to be working very well. It has an area of about a thousand square miles of a combined urban and rural character.

The public ownership principle is favoured by the Incorporated Municipal Electrical Association and, coming from such a body, it may be assumed that an enlargement of municipal ownership in some shape or form is envisaged. It is very unlikely that this view will find general acceptance. It is worth remarking, however, that another J.E.A.—the North-West Midlands—is a combination of local authorities, as is the Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board.

This mention of Joint Electricity Authorities may be terminated by a reference to two peculiar cases. The powers of the North Wales and South Cheshire J.E.A. are exercised solely by the North Wales Power Co. in an area of over 4,000 square miles and eventually the local authorities concerned may take over the distribution systems in their areas. Then there is the London J.E.A. which, as at present arranged, is to take over the London Companies in 1971. It can acquire other undertakings by agreement and has already done so in a number of cases.

We do not suggest that the 1919 Act, or the original proposals of which it was the emaciated issue, should form the basis of a reconstruction plan, but the Joint Electricity Authorities are worthy of study as examples of co-operation, particularly when the question of ownership is under consideration.

Reorganisation Plans

IT is to be hoped that any consideration within the industry of schemes for the reorganisation of the country's electricity supply will not lean too much towards the generation side. While the central ownership of all power stations may be considered fundamental by some authorities, existing arrangements appear to be as near to that supposed ideal as is necessary until the far more immediately vital question of distribution is settled. It is tolerably certain that politicians and others who are determined to effect radical changes in the supply industry are not much concerned with the generation side and so if excessive time and thought are devoted to this matter it may be found that these outside interests will "put over" their own distribution schemes while the attention of the industry is otherwise engaged.

Cable Insulation

GROWING shortage of natural rubber has necessitated the issue of new regulations in the United States for limiting its use. Conductors wholly or partly insulated with an appropriate synthetic material, the *Electrical World* states, will have the same appearance, diameter, splicing and handling characteristics and will stand the same voltage tests as those of the more conventional kind. The proportion of ordinary rubber permitted varies with the duty of the cables, but outer coverings must be of synthetic material, which is said to be superior to rubber (unless specially compounded) in its resistance to acids, alkalis, oil, heat, corona and sunlight. To the wireman or the user the change will not be noticeable, whatever it may mean to the manufacturer.

Rubber Substitute

EXPERIENCE with Buna (derived from Butadiene) has made it desirable to employ crude rubber for certain critical applications. While the use of the latter is not permitted for house-wiring under the new regulations, up to 40 per cent. may be incorporated in the insulation of individual conductors of portable multi-core cables with a view to obtaining flexibility as well as ability to withstand double vulcanisation when the outer covering is subsequently treated. For wet places a proportion of natural rubber is also considered desirable.

Voltage Origins

IT is widely accepted that voltages have been standardised in multiples of eleven to allow for a 10 per cent. drop in the mains, thus giving a neat multiple of ten as the declared voltage at consumers' terminals. This theory is controverted in the *Wireless World* for September by Mr. C. R. Cosens (of the Engineering Laboratory, Cambridge), who submits that the genesis of this odd practice is to be found in earlier telegraphy, when electrical pressure was referred to in terms of Daniell cells, each of which had a reasonably constant e.m.f. of 1·1 V. On the adoption of the volt as standard in 1882, dynamos designed for a supply pressure equivalent, for example, to that of 100 Daniell cells were renamed as 110-V machines. Actually, 10 per cent. drop never had any validity, since in those days the maximum variation permitted (under penalty) was $\pm$ 2 per cent. from the declared voltage.

Lower Voltages

No explanation of voltage drop will easily account for the adoption of 230 V. That was intended, as it is suggested in our contemporary, to allow a safe margin below the statutory value assigned to "low voltage," *viz.*, 250 V, and at the same time to give the satisfactory round figure of 400 as the three-phase voltage for motors. It also provided a good compromise between

existing systems of 240 V (leaving a smaller supposedly necessary margin) and 220 V (200 Daniells) which was required for lamp standardisation.

The N.E. Coast

OTHER reasons have, however, been responsible for the various voltages adopted here. On the North-East Coast better understanding of the statutory requirements with regard to low voltage led to the choice of the full 250 V as the "declared pressure" with its associated three-phase voltage of 440. Sound technical reasons were also behind the selection of 40 cycles per second (now changed to the standard of 50 cycles) for the pioneer three-phase system. Rotary convertors were less stable above that frequency and arc lamps below it—two most important considerations in those days.

Flex Troubles

A CIRCULAR sent to members of the E.C.A. by the Director (Mr. L. C. Penwill) raises the old problem of flexible cords for portable appliances. Even before the war they were too often twin-core without provision for earthing and they were frequently considered too short. The war has accentuated these shortcomings, but the E.C.A. has successfully taken steps to improve matters. There will be general agreement that three-core flex should be attached to these appliances, but it is questionable whether inordinately long flexes should be encouraged. Unfortunately, until all houses are provided with a sufficient number of socket outlets trailing flexes must be endured. Perhaps, then, it is better to have ample properly fitted lengths of flex than to risk "extensions" by amateur wiremen.

Research and Export

IN an industrialised world ingenuity of design and excellence of construction will be indispensable attributes of goods for export. If Great Britain is to regain her position in overseas trade she must be prepared to go one better than her competitors. The war has revealed a wealth of first-class research and inventive talent in this country and it has been given its opportunity, for in wartime expense ranks second to expediency. Adequate financial resources for the development of promising ideas must continue to be available after the war. As Sir Harold Hartley points out in his pamphlet "Industrial Research: What it Means to Industry" (published by the F.B.I.), there has not hitherto been sufficient appreciation in this country of the value of science in industry and we have spent less than the United States and Germany upon research. Sir Harold shows that industrial research pays good dividends and must form the basis of any expansion of export trade.

Latin-American Trade

ACTIVE encouragement is being given by the United States Government to the continuance of advertising in Latin-American countries by American manufacturers and exporters. Most of it, in view of inability to divert materials from war purposes, is a promise of things to come designed to preserve goodwill and keep producers' names alive in the memories of past and prospective customers. Another preparation for post-war activity being actively pursued is the production of standards designed to meet the requirements of Latin-American markets. It is thought that hitherto standards have been too high (a view which has often been expressed in relation to British goods). As a possible alternative to new designs a certain measure of "uprating" has been suggested. The idea is that new nameplates bearing data based on European standards should be substituted for the originals. "European" in this context evidently means Continental.

"The Tourmalin"

KNOWN in 300 BC as the "fossil" lyncurium which possessed the ability to attract particles, tourmaline (then shorn of its "e") provided a fertile theme for speculation in the middle of the eighteenth century. In Joseph Priestley's "Electricity" (1769) are described the researches carried out a few years before, which showed that the "stone" became electrified with heat, but no mention is made of the production of similar results by means of mechanical pressure. Priestley believed that a study of the behaviour of tourmaline would throw a great light upon the general properties of electricity, but he could not foresee the important application of its piezo-electric effect to the frequency control of short-wave oscillators in wireless stations.

Fostering Export Markets

U.S. Cultivating Latin America

AS we have already reported, Mr. Eric A. Johnston, president of the United States Chamber of Commerce, has been on a visit to British centres in order to discuss post-war co-operation between his country and the United Kingdom. Prominent among the subjects he has mentioned is the great interest shown in the United States in building up the earning power, and therefore the purchasing power, of those regions of the world where the latter is at present low. He expressed the view that the resources and skill of the highly developed countries should be utilised to promote both their own prosperity and that of countries still comparatively undeveloped. This opinion has been gaining ground steadily in the United States for some time. It implies a levelling up of the standard of living of backward peoples, for instance by a wider distribution of all the advantages of electricity.

In connection with this subject of stimulating consumption in relatively undeveloped lands, the United States Department of Commerce some six months ago reminded American exporters that in their country what is now regarded as normal demand is really demand which has gradually been stimulated by methods of high-pressure salesmanship. At that time the Department took action of which there seems to be no counterpart here. It appointed a specialist in industrial advertising whose whole time is to be spent in assembling data on all phases of advertising, analysing such data, and exploring new avenues of publicity. Later, the Bureau will organise a special section for assisting the advertising profession, or, as the Americans prefer to call it, the advertising industry. At the same time official emphasis is laid on giving first place to winning the war.

Maintaining Customers' Goodwill

The Department of Commerce has recently carried its campaign in favour of export advertising farther. It calls attention to the fact that this year manufacturers have been increasing their advertising in South America, although for the most part they have nothing to sell in wartime. They are telling old and potential customers why they cannot supply their products until victory is won. Many put out instructions on how to preserve those articles now in use so that they will last for the duration. Others promise better goods after the war. All these measures are officially applauded because of the impossibility of sending representatives to act as liaison agents between manufacturers and their Latin-American markets.

There is food for thought in the official and semi-official pronouncements on advertising and the co-operative development of backward countries. Not that there is much likelihood of British manufacturers wanting an official advertising consultant. But if there is to be post-war co-operation in Latin-American development, the questions arise: How soon, and where shall it start?

American I.E.E. Interest

At a national technical meeting of the American Institute of Electrical Engineers in June a major theme of discussion, says the *Electrical World*, was the way in which the American electrical engineering profession could "further the excellent start already made in fostering trade to the mutual advantage of all the Republics in the American hemisphere."

Officials of the agencies which have laid the groundwork on the basis of the "good neighbour" policy stated what United States agencies could do "to win Latin-American acceptance of our co-operative spirit in technical matters of trade with a view to bringing our standard of living within their reach by interchange of ideas, accommodation of engineering standards and exchange of goods in trade."

Mr. R. E. Zimmerman, president of the American Standards Association, told the Conference that several South and Central American countries had established standardising bureaux since the A.S.A. organised an inter-American division last December. Another speaker suggested relaxation of some American standards to meet Latin-American requirements.

A Brazilian representative agreed with this and expressed the view that the United States salesman was often less persistent and less helpful with catalogues and information than his European competitors. He urged the manufacture of small goods in Brazil and the importation of larger equipment.

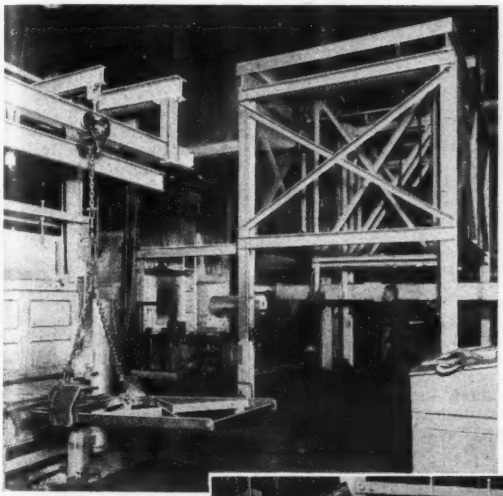
A further delegate said that European equipment was not necessarily flimsy; it was built to "different proportional costs of labour and material and geared to correspondingly different standards." He suggested that American electrical equipment might carry a second nameplate stating its capacity in terms of European standards of rating.

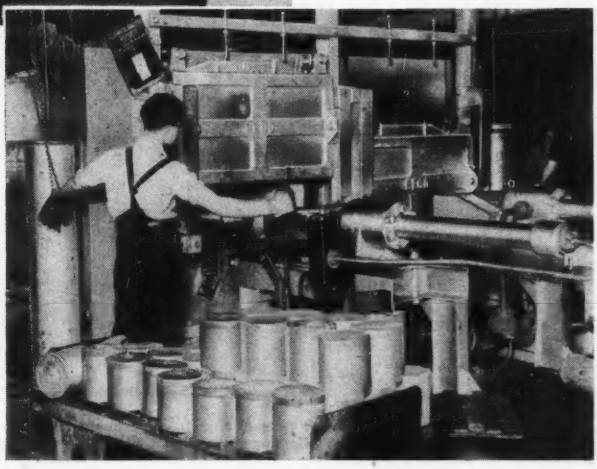
A book exporter stated that American electrical books were preferred by Latin Americans because they were "complete from rudiments to the precepts of practice, whereas the European books verge towards the theoretical."

Extrusion of Light Alloys

Preheating and Hydraulic Operations

IN the *Electrical Review* of January 1st, 1943, we described, from the electrical angle, the production of aluminium up to the alloying stages in which the virgin metal is remelted with the requisite alloys into rolling slabs and extrusion billets. We are now able to follow the processes in one of these later production avenues—extrusion and drawing—as we saw them recently during a works visit. The first process for extrusion is heating to about 500 deg. C., and we saw this effected in gas furnaces in the case of the larger billets and electric furnaces for the smaller ones.





Above: For handling the very large billets heated in the gas furnaces there is an electrically operated billet extractor at the delivery end of each furnace
Right: Billets are fed into the furnace individually on the push-through principle by a hydraulic ram

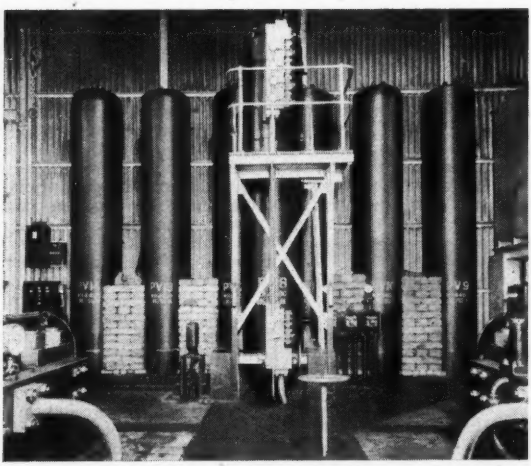
Each electric furnace is an "Efco" horizontal twin-chamber equipment measuring overall about 30 ft. long and 12 ft. wide, with each chamber measuring internally about 3 ft. wide and 18 in. high. The two chambers are separately operated and controlled so that the complete equipment is virtually two furnaces, the banking of the two chambers being purely for economical construction and lay-out. Each chamber has a total loading of 120 kW and is arranged in three heating zones, each zone being separate and served with electricity at 400 V, three - phase, balanced delta. For each zone there is also individual pyrometrical control by means of a suitably placed thermo-couple connected to a three-way temperature indicator and furnace control relay panel. The temperature indicator is of the two-pointer (one pre-set and one indicating) type in which contacts made or broken on either side of the pre-set pointer are in circuit with relays which operate the element contactors. Tape resistance elements are disposed in the hearth and the roof.

Charging the furnace is effected on the push-through principle, the billets being fed into the furnace individually by

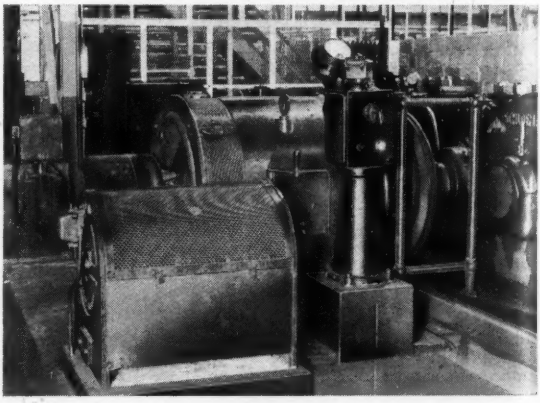
a hydraulic ram at the feeding end. Each feeding operation pushes the whole line of billets along the chamber and thus delivers one billet to a manual-runway suspended chair at the delivery end. By means of this chair and runway the hot billet is transported to the extrusion press. For handling the very large billets heated in the gas furnaces there is an electrically operated billet extractor at the delivery end of each furnace. In this case the extractor carriage actually removes the billets individually from the furnace and the two essential motions for this —elevation and traverse— are imparted to the carriage by 10-HP and 6-HP motors, respectively. Both motors transmit initially through worm reduction gears, from which there are chain transmission for the elevation and rack and pinion drive for the traverse. The whole equipment is built up in a steel-girder structure from which is suspended a push-button control panel for the two motors.

By means of the runway chair or the mechanical extractor, then, the billet is delivered to one or other of the extrusion presses which vary only in the different operating pressures necessary to meet the requirements of the different classes of extrusion work. The billet is first placed between the press container and the hydraulically operated ram, so that the ram, billet and container hole are all in line and, after the insertion of a die suitable for the section it is required to extrude, the ram is slowly brought to bear on the billet, first pushing this home into the container and then pressing it through the die. The extruded section passes slowly from the die on the other side, travelling along a roller table extending from the press. When the billet has been passed through the die as far as is practicable the die is withdrawn in the direction of the extrusion to a point where hydraulic shears cut off the section from the die which is immediately returned to the press ready for the next cycle.

The extrusion presses are served by two hydraulic systems, one supplying 4,400 lb. per sq. in. and the other 3,500 lb. per sq. in., each system being common to the presses for which its particular pressure is required. Each system embraces a number of motor-driven pumps which pump water against compressed air. The air is con-

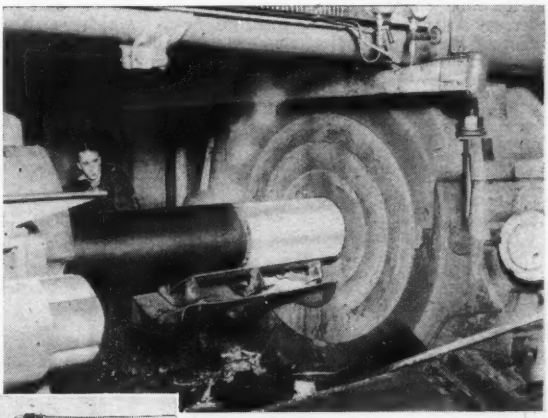


A series of large vertical air bottles have a common outlet to the top end of a " balancing " bottle (front) into which the water is pumped at the bottom ; note magnetically operated mercury-switch controls at top and bottom



A typical pump driving scheme employs a 380-HP, 3.3-kV, 735-RPM slip-ring motor which first transmits directly through a magnetic clutch

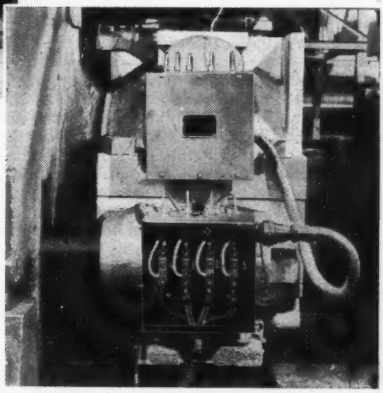
tained in a series of large vertical air bottles which have a common outlet to the top end of a "balancing" bottle into which the water is pumped at the bottom. Also at the bottom of the balancing bottle is the necessary connection for the pressure supply to the presses. A typical pump driving scheme employs a 380-HP, 3·3-kV, 735-RPM slip-ring motor which first transmits directly through a magnetic clutch which is supplied at 60 V, DC *via* suitable slip rings, and is loaded at 400 W. The clutch has a diameter of about 30 in. Transmission is then through a pin-type coupling to a large reduction gear box with an actual ratio of 720 RPM at the motor shaft to 140 RPM at the pump shaft. The motor is an English Electric machine and it virtually starts up directly on the operation of the main circuit-breaker in the substation, pulling in gradually on a water resistance. Remote operation of the circuit-breaker is effected from a pedestal-mounted push-button panel near the motor.



The billet is first placed between the press container and the hydraulic ram, so that the ram, billet and container hole are all in line

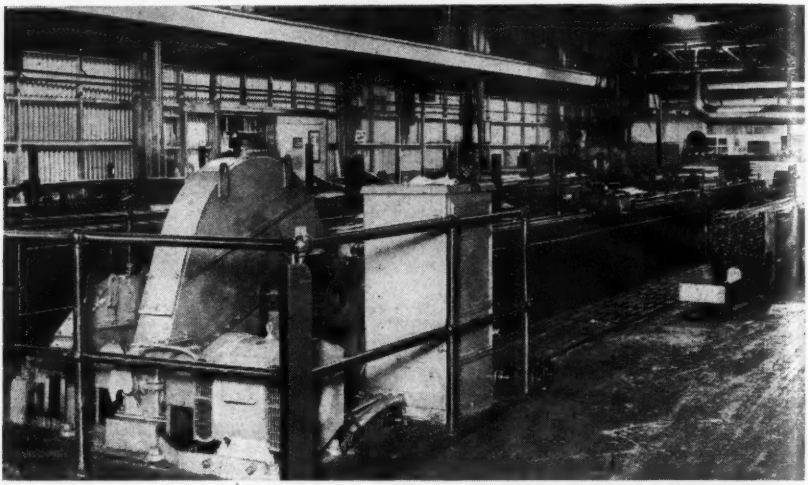
Copper rods are carried in holes longitudinally through the induction-heated container; by means of heavy links the rods are connected in series; container down for repair

The pump motors run continuously when in operation, the pumps themselves being started and stopped independently to meet the varying hydraulic demands. This is effected automatically by means of magnetically operated mercury switches which control the supply to the clutch magnet system, according to the rise and fall in the pressure of the hydraulic-air system. Each control magnet is a horse-shoe permanent magnet and is carried at one end of a pivoted arm at the other end of which is an inverted copper bucket. The bucket floats on the surface of the water in a "by-pass" connecting the top and bottom of the air-water "balancing" bottle. The two poles of the horse-shoe magnet are in line



From the bottom box on the resistance-heated container there is a plug and socket connection to the top box

vertically and between them is disposed one end of the glass envelope of a mercury switch. Within the glass envelope at the magnet end is a soft-iron armature which is carried on a pivoted arm which also carries at its other end the dipper contacts of the mercury switch. Thus an up or down movement of the magnet poles consequent on a vertical movement of the bucket with a rise or fall of the water level will produce, by magnetic attraction of the armature, a make



The chain of the drawing machine is driven by a 50-HP motor with transmission through three sets of gearing on to a shaft carrying the sprocket wheel engaging the chain

or break of the mercury switch and, in turn, clutching or declutching of the magnetic clutch in the motor-pump transmission system. Actually, there are two of these mercury-switch devices for each motor—one for starting and one for stopping—and they are all located near the top of the air-water bottle. Similar switch devices are also situated near the bottom of the bottle, but these are purely safety devices to prevent the bottle being completely emptied of water.

Initially, of course, it is necessary to charge the air bottles, and from time to time air losses must be made up, and to meet these requirements there is available a Belliss & Morcom three-stage air compressor capable of providing up to 5,000 lb. per sq. in. It is driven by a 25-HP motor with a three-to-one ratio transmission *via* "Texrope" between the motor and compressor pulleys.

When the billet is first introduced to the press it often has to remain in the press container for a little time, and to prevent cooling off of the billet during this time the container itself is heated electrically; and as the container is almost a solid cylinder of steel weighing up to twelve tons it will be appreciated that the heating is quite a formidable task. Two heating systems are employed—induction for the larger containers and resistance for the smaller ones which weigh about six tons each. For the induction heating, copper rods are carried in holes longitudinally through the container and near the periphery, rather like some of the constructional schemes for modern squirrel-cage motors. Current is passed through the rods and the heating is effected by the eddy currents which are consequently induced in the steel casting.

Each rod is about $\frac{3}{4}$ in. in diameter and is housed separately in its particular hole in which it is insulated from the container metal by means of $\frac{1}{8}$ in. of insulating material which is wrapped round the rod before the whole is inserted. By means of heavy copper links the rods are connected each to its neighbour, alternately at either end of the container, so as to form a complete series system right round the container. The links, suitably drilled, are driven on to the rod ends and the electrical connection is ensured by brazing. The ends of the rods and the links are housed in a circular recess right round the container, and insulating material is packed around the links and bar ends in the recess. Finally, the recess is covered in by a metal ring which is welded to the body of the container. The adjacent first and last bars of the series system are brought out to suitable copper cable-con-

necting bars to which they are brazed. Each induction container represents a load of 100 kVA and supplied at about 80 V from its own special transformer.

All the containers are arranged in "split" housings, so that the top section can be lifted off to facilitate changing the container. In the case of the resistance-heated containers B.T.H. "Torribar" heaters are arranged around the inner surfaces of the housings, and because of the "split" arrangement of each housing the elements are in two separate sections—one for each half of the housing. A common supply cable is brought into a terminal box on the bottom half of the housing, and from this to a similar box on the top half there is a four-pin plug and socket connection. Each heating section is supplied separately from its own box at 400 V, three-phase, on star connection.

The total loading of these heaters is about 58 kW and the supply is from the factory distribution system direct. The difference between the loading of the induction and resistance heated containers is simply explained by the difference in weight of the respective containers—twelve and six tons.

It takes a considerable time (about ten hours) to heat up a container from cold, and in order that this shall not result in corresponding loss of operating time of the extruding press when an induction-heated container is changed, the new container is pre-heated before it is put in the press. This is done by covering the container with a special insulated hood and connecting it up to a suitably rated transformer specially available for this purpose.

The supplies to the containers are automatically controlled by means of pyrometers inserted into the bodies of the containers. As the finally extruded section leaves the delivery roller table from each press it is cut into desired lengths by means of a motor-driven pendulum saw located at the far end of the roller table.

Cold-Drawing Processes

Closely allied to extrusion are the cold-drawing processes which we saw employed for the production of tubular sections. Whereas in the case of extrusion the billet is pushed through the die, the billet meeting the sharp end of the die first, in the drawing operation the billet is pulled through and it enters the "bell" of the die first. Tubular section is produced from hollow billets which are first reduced to a certain size by extrusion. The line of demarcation between extrusion and drawing rests on both mechanical and economic considerations, and it is necessary to provide different sizes of billets for different final sizes of tubes. In most cases a tube has to be drawn several times before its final size is reached, and the drawing operations are interspersed with annealing ones because of the hardening effects of the drawing processes on the metal.

For each drawing operation a mandrel of suitable size is inserted in the tube, the end of which is tagged down for the initial insertion in the die and gripping by the dogs of the drawing machine to permit pulling it through the die. All the drawing machines are electrically operated and we saw many types at work, varying mainly on account of the differences in the class of product on which they are engaged. In principle, however, they are all similar and we need not refer in detail to more than one machine.

It consists essentially of a long table at any convenient point along which the die, in a suitable housing, can be fixed. Along side members of this table slides a wagon carrying the tube-gripping dogs, and between these members is a continuously running chain to which the wagon is anchored at will. The chain is driven by a 50-HP, 1,450-RPM squirrel-cage continuously running motor with transmission through three sets of gearing on to a shaft carrying the sprocket wheel with which the draw chain is engaged and which revolves at about 50 RPM. The motor is star-delta started under push-button control through contactors.

Cyclometer Type Meters

THE skill and care needed for accurately reading the dial markings of meters are minor handicaps so long as trained men or women are employed for compiling the quarterly records. The greater facility with which a simple row of figures may be noted, however, is immediately evident when untrained people have to read meters and such a system would also be advantageous to the many householders who now endeavour to check their consumption of electricity in the interests of economy.

Notwithstanding the greater effort needed for reading watt-hour meters fitted with the dial-pointer type of counting train, that kind of instrument is favoured in Great Britain and the United States. The reason for this is the avoidance of the variable friction that occurs in cyclometer registers when several drums are coupled while rotating. The heavier such drums are the greater is dislike of their use likely to be, so a cyclometer register drum which is made of aluminium has been produced by Landis & Gyr, S.A., of Zug, Switzerland. Its small weight, combined with the inherently more compact construction of cyclometer registers as compared with the dial-pointer type, should arouse interest in the easy reading of counting trains.

A letter received direct from Switzerland explains that this development has not by any means been due to scarcity of raw materials. It is said to have resulted from the company's regular research into meter construction, so that under the circumstances the non-availability of tin alloy formerly used in making cyclometer registers has actually helped the substitution of the lighter metal.

Transmission Line Supports

Economy in Metal on High-Voltage Systems

By W. F. Bowling

BRIEFLY, the function of a transmission line support is to carry overhead conductors safely at the regulation height above ground level with the most economical use of available material. It has also to provide sufficient clearance both between the individual wires and between live metal and the support under the specified conditions of temperature and loading. For single-circuit lines up to 33 kV using pin insulators, it is doubtful whether any type of support can compete on a price basis with the single wood pole. Above 33 kV, suspension insulators are usually employed and this introduces problems of clearance not associated with insulators of the pin type. Due to the swing of the insulators in the wind, additional cross-arm length is required. The greater length of the insulator string also calls for additional vertical spacing, both between cross-arms and between the lower cross-arm and ground level, necessitating higher supports. In addition, the span may have to be increased owing to the relatively high cost of insulators per support. All these factors tend to make the use of single wood poles uneconomical since their cost increases rapidly with height and adequate supplies of suitable timber become difficult to obtain.

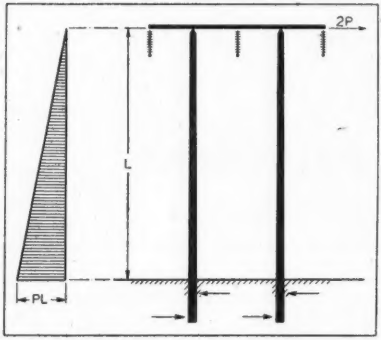


Fig. 1.—Normal type of portal support

The economic range of wood poles carrying suspension insulators is increased by the portal structure using two single poles, connected at the top by a horizontal cross-arm, as shown in fig. 1. With this construction, the height of the support for a given ground clearance is kept to a minimum, while the spacing between conductors can readily be increased at small additional cost. Lines of this type have been erected, both in this country and abroad.*

While this is a sound and economical method of supporting conductors, its usefulness is limited when the characteristics of the line are such as to call for long spans and heavy loadings. Under these circumstances, the designer has to consider the possibilities of a cheaper and more easily obtainable material.

This choice is very limited, and almost restricted, in the case of tall structures, to the use of lattice steel. There are, however, advantages in the use of this material, inasmuch as the strength of the various parts of the support can be adjusted by modification of outline and choice of sections, of which full advantage should be taken in order to keep the weight to the minimum.

With the construction illustrated by fig. 1, the bending moment on each support varies linearly from the top, reaching a maximum at or near ground level. In an effort to reduce this bending moment, consideration has been given to the effect of connecting the two side supports by means of a horizontal member,

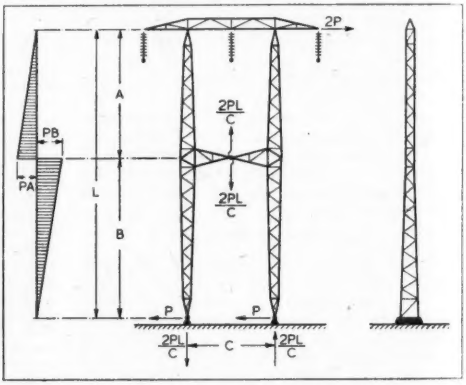


Fig. 2.—Modified design, embodying horizontal tie

* "Some Problems in Transmission Line Design," by A. Burke, *I.E.E. Journal*, Vol. 90, Part 2, No. 15.

pin-jointed at the centre, situated at approximately mid height, as shown by fig. 2. With this arrangement, pin-jointed connections can also be used both at ground level and at cross-arm level without affecting the stability of the structure.

Using this construction, the maximum bending moment occurs at the level of the horizontal member, and if this member is at mid height, the maximum bending moment is reduced by 50 per cent. of that obtained with the normal type support. When due allowance is made for the horizontal member, the saving in weight may be as much as 20 per cent. Where supports of additional height are required, parallel-sided extensions can be arranged above and below the horizontal member.

With the normal type of support, the foundations have to be capable of withstanding a relatively heavy bending moment. This bending moment has to be resisted by lateral earth pressure, which calls for deep, expensive foundations, and introduces heavy shear loads in the structure below ground level. By the introduction of the centre member the foundation loads are reduced to uplift and compression, combined with a slight shear. These types of loads can be more easily catered for in foundation design, resulting in a lighter foundation and a saving in excavation and field work generally.

A further advantage of this type of structure is that, due to the side members being pin-jointed at ground level, erection is simplified, as the two halves can be assembled on the ground and hoisted simultaneously on either side of a light standing derrick. The only work to be carried out by climbers is the fixing of the top cross-arm and the connecting together of the two side members by means of the centre pin.

Oil Deterioration

Testing and Reconditioning

By C. H. Pike,
Grad.I.E.E.

A CERTAIN amount of maintenance of insulating oil, involving periodical tests to ascertain the nature and extent of any deterioration, is still necessary, even though it can be reduced by minimising the causes.* Normally refined, clean, dry oil can dissolve about 70 parts of water per million at 25 deg. C. and about 120 parts at 75 deg. C., some of which is in true solution and some in suspension. Water in excess of the amount soluble at the existing temperature settles out.

The tolerable percentage of water is difficult to determine, for, although a minute quantity of dissolved water accelerates mechanical deterioration of oil-immersed cellulose insulation, its effect in practice may be negligible. Much depends on the operating temperature and the quantity of air available for oxidation. With an insulation temperature below 75 deg. C., the deleterious effect of some dissolved water is doubtful; between 75 and 100 deg. C. deterioration is probably accelerated if air is also present; above 105 deg. C. (the limit for Class A insulation) there is little doubt that deterioration is accelerated under any conditions.

The electric strength of oil free from solid impurities may be as high as 80 kV per mm., even when the water content is above the limit of solubility, so that breakdown values of about 30 to 50 kV do not necessarily indicate that oil is free from a possibly deleterious quantity of water. The practical e.s. test of commercial oil is based on the assumed presence of solid impurities which absorb water, so that the combined effect may reduce the breakdown value to below 30 kV, whereas one without the other may not. The elimination of almost all the dissolved water may not be of critical importance, but is obviously desirable if it can be achieved.

For the detection of minute quantities of water in clean oil the crackle test is often employed since it has been known to reveal the presence of water in oil which withstood more than 45 kV for one minute. With efficient purifying apparatus which normally removes dissolved water and solid impurities, an e.s. of at least 50 kV per mm. should be obtained after treatment. The 30-kV standard e.s. test is no true criterion of oil purity and should be supplemented by, at least, a crackle test and a test for acidity.

Power-factor (dielectric-loss) tests do not distinguish between different types of contamination, so that if in service a standard reference value is exceeded other tests are required to establish the cause of deterioration. When, however, the predominating cause of deterioration is apparent, a power-factor test after appropriate purification determines the efficacy of this treatment, an unsatisfactory value indicating that it has not removed all contaminating agents or, if the removal of water and solid impurities is certain, that there is excessive acidity.

* *Electrical Review*, July 9th and August 6th, 1943. "Insulating Oils" and "Oil Maintenance," by C. H. Pike.

With oil of low acid value and free from solid impurities, a high power factor probably shows the presence of dissolved water. In a particular case the power factor of a dry oil was 0·002; with 2, 10 and 45 parts of water per million the power factors were approximately 0·01, 0·022 and 0·08, respectively. The power-factor test is sensitive enough to detect the minute quantities of water which may be acquired by initially dry oil as the result of decomposition of cellulose insulation operating at high temperatures.

Power-factor tests, in conjunction with e.s. tests at about 50-60 kV per mm. permit reliable qualitative analysis. Special oil cells are required to hold samples and reference values of power factor must be established by laboratory experiments on samples from equipment in service or artificially contaminated, correlating power with acid value, water content, etc. On this account power-factor measurements for routine oil maintenance are generally impracticable except in the case of major power systems, *e.g.* the grid, for the investigation of solid insulations *in situ*.

Insulation Resistance Measurement

Measurements of the insulation resistance of oil by applying a medium DC voltage can be used to determine the quality. Here again a suitable oil cell and correlation experiments are necessary, but the method gives good results with comparatively simple equipment. In general, however, oil maintenance is determined by reference to e.s. acid value by chemical tests, and flashpoint may also be checked from time to time. When systematic and sensitive tests of oil in service are not essential or practicable, routine purification, as distinct from treatment decided by measurement of deterioration, is advisable. In the absence of specific evidence of high oil quality, more frequent treatment may be required.

Practical experience may suggest that even when the e.s. is below 30 kV no harmful effects result; consequently, a high degree of purity serves no useful purpose, especially when electric strength is unimportant due to prevailing low electrical stresses. Probably, however, a reduced rate of chemical deterioration of both oil and solid insulation results from complete removal of dissolved gases, water and solid matter, apart from the added security against breakdown which it gives.

In transformers, the removal of the absorbed oxygen, which causes oxidation, and the water, which is a product of oxidation and accelerates acid development, minimises the adverse effect of exposure to atmosphere of an oil surface at high temperature. Removal of sludge increases cooling efficiency, thus reducing oxidation, and also increases the resistance of the oil to emulsification so that less water would be held in suspension. Removal of fibrous and other foreign particles decreases the effect of any water present. The various contaminating agents interact directly or indirectly to produce cumulative deterioration. For instance, contamination that reduces the e.s. considerably may lead to local discharges producing chemical deterioration. With circuit-breakers, removal of carbon is essential to safe operation and for the maintenance of a minimum e.s. the periods between treatment are longer with complete than with partial purification.

A major substation where supervision is continuous may warrant a small fixed equipment of larger capacity if maintenance staff have to visit the site. Portability is a primary consideration in certain cases, and since purification may have to be completed in a limited number of hours, portability, capacity and efficiency may have to be considered in relation to each other. When oil in equipment in service is to be purified by circulating until it attains a given e.s., there is a distinct advantage in using apparatus which delivers oil well above the e.s. actually required. The e.s. of the bulk of the oil reaches the required value after a shorter period of time than that necessary with similar apparatus of lower efficiency. Alternatively, high efficiency permits smaller capacity for a given time of circulation and greater portability.

Purification Methods

In one type of purifier combining edge-filtration and vacuum-dehydration, dirty oil is heated until complete dehydration is effected under high vacuum. Before this occurs the oil is forced through a filter consisting of packs of special paper rings maintained under end-compression by spring loading so that the interstices are of infinitesimal size and the solid impurities are deposited at the paper edges. Minute subdivision of the oil causes the particles of moisture to be converted into steam as they penetrate to the space inside each pack, which is maintained at a high degree of vacuum. Thence the oil passes into a vacuum receiver where the water vapour, air and other gases are mechanically separated from the oil in passing over a series of shallow trays. Solid deposits can be cleaned off the filter packs by passing compressed air through them in a direction opposite to that of the normal oil flow. With this type of purifier e.s. values of more than 60 kV can be attained after a single passage of the oil.

Another type of edge-filtration purifier employs packs of brass rings with annular grooves between them. A filter bed is produced on the outside surface of each pack by introducing a charge of a filtering medium at the beginning of operations

which, after being mixed with oil in a special chamber, is jumped to the ingoing surfaces of the filter packs where it is deposited. When the filter bed is formed the oil is cleaned by being forced through it under pressure but without preheating, the process being termed "cold." Solids and a certain amount of water are effectively removed, but an abnormal quantity of water necessitates an initial passage through a water eliminator.

A centrifuge is effective for removing large quantities of water. The process is more rapid, and in some circumstances more efficient, when oil is preheated to about 60-70 deg. C., but to avoid liability to oxidation, air should be excluded. Apart from oxidation the presence of aerated oil in high-voltage equipment is undesirable. To prevent aeration modern centrifuges are air-tight, and may be supplemented by a vacuum pump. For purifying oils heavier than Grades A or B, preheating to 140 deg. F. or more may facilitate filtration, but the oil suppliers and the makers of the apparatus should be consulted. Replacement may be more satisfactory.

Acidity is the most troublesome form of contamination. In transformers it will probably be prevented by fitting conservators and/or chemical breathers. Generally, acid oil is replaced and reconditioned by the manufacturers. In recent years activated alumina has been found to be effective in removing acid in solution because of its selective adsorptive property. Investigations of transformer oil in actual service have indicated that below a certain value of acidity (about 0·4 to 0·5, according to the oil) sludging will not occur. To maintain the oil well below the sludge point transformers have been equipped with a small, cylindrical tank filled with activated alumina in canvas bags. This tank was fitted vertically to one side of the transformer tank so that the oil circulated through the alumina by thermo-syphon action, the arrangement being similar to a cooling tube. Alumina tanks were fitted to some 2,500-kVA transformers with excellent results. The transformers were operated at a slight overload continuously and before the alumina tanks were fitted the acid value increased by about 0·02 in a year. To maintain the 700 gallons of oil in each transformer at the original acid value for one year required 50 lb. of alumina, which had to be reactivated at the end of this period. Such means may be justified economically in certain cases, but it is probably more satisfactory to prevent acidity rather than attempt to cure it.

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Argentine Fuel Shortage

REFERENCE was made here recently to the serious lack of coal with which Argentina was faced, a shortage which necessitated the burning of maize and other vegetable products for power purposes. At a meeting of the Argentine and River Plate Centre of the Institute of Transport in June the effects of this shortage on the operation of electrified railways were described by Major R. K. Hubbard, O.B.E., assistant general manager of the Central Argentine Railway.

Major Hubbard said that the Babcock boilers in the railway's power house were designed for Welsh washed beans although crushers had been installed to enable large coal to be used in an emergency. Except for shelled maize it was impossible to use substances such as fuel oil, firewood, charcoal or oil seed cake owing to the special design of the furnaces and chain-grate stokers.

When it had been available threshed maize had been used in considerable quantities; in fact the basic load had been met at times by this substitute alone, the coal-fired boilers being brought into action at peak periods only. The use of maize seriously reduced the capacity and availability of the boilers which had to be taken out of service for long periods for cleaning.

Now that supplies of maize were running short coal was indispensable and in the absence of British or American coal they had fallen back upon a mixture of Brazilian coal and Mendoza coal ("asfaltita"). It had been found impossible to use either of these alone.

In these circumstances everything had been done to economise fuel. Little saving would result from shutting down the electric services for a part of the day as the boilers would have to remain under steam. Electric trains used a much smaller amount of fuel per gross ton-kilometre than steam trains owing to the much greater efficiency of stationary boilers than those on locomotives. By reducing the schedule speed by 8 per cent. it had been possible to effect a saving of 12 per cent. in the energy used, with a consequent reduction in fuel consumption. Other operational steps taken to secure economy had included a reduction to the minimum of the proportion of motor coaches to trailer coaches and an intensified avoidance of empty coaches.

An interesting point came to light when, in endeavouring to comply with the Government's restriction of special trains, it was proved that to deal with the Sunday race traffic additional trains entailed a smaller increase in fuel consumption than the addition of coaches to the normal number of trains.

Guidance for Contractors

Holidays-with-Pay Arrangements

IN a letter to the members of the Electrical Contractors' Association the Director (Mr. L. C. Penwill) states that the adoption of the holidays-with-pay scheme by the contracting industry automatically obliges all electrical contractors to comply with its terms in accordance with the licence issued to them by the Ministry of Works. It is considered that non-compliance with the agreement will be regarded by the Ministry of Labour in a very serious light.

Arrangements have been made for the reimbursement of costs incurred under the holidays-with-pay scheme arising in the case of direct contracts placed by all Government Departments. In the case of lump sum contracts based on tenders dated before May 31st, claims for reimbursement will be considered *ex gratia* on "hardship" grounds; where there is a variation clause this is taken care of. In subsequent contracts the contractor will be deemed to have had an opportunity of providing for the extra cost. For maintenance and all contracts on a daywork basis current on May 31st reimbursement will be on the basis of the proper proportion of the weekly contribution as calculated on hours worked for the individual service. For Ministry of Home Security prime cost contracts the cost will be linked with those under Clause 17 (1) (c).

In the case of sub-contracts to main contracts placed by Government Departments reimbursement will follow similar lines, provided both main and sub-contracts contain the same wages variation condition.

Notification of Accidents

Mr. Penwill says that inquiries which he has received suggest that members are unaware of their liabilities in respect of the notification of accidents. If an accident occurs in a factory which causes the death of a person engaged in the factory or disables him from earning full wages at his work for more than three days the occupier of the factory must give written notice to the Factory Inspector for the district. If the accident occurs to a contractor's employee working in a factory the contractor must at once notify the occupier of the factory.

Factory Lighting Grants

Financial assistance is accorded factories on the "vital" list in the improvement of their artificial lighting. Grants are assessed on the following basis: From the full cost of improvements there is deducted £1 per 100 sq. ft. of production floor area where the illumination is below Factory Regulations minimum standards. (This figure is adjustable in schemes which have an abnormally high or low cost per point.) Of the net amount thus obtained 35 per cent. is payable in the form of a direct grant. In respect of the remaining 65 per cent., a contribution is payable according to the expected permanent value to the factory owner of the improvements installed.

War Damage Insurance

It has been held by the Board of Trade that cookers and other electrical commodities which are hired out by supply authorities and others are items which should be included in the "Business Scheme" for war damage insurance purposes. Mr. Penwill draws his members' attention to a decision which has been made by the Board of Trade that an electrical contractor and retailer who is in the habit of holding certain current-consuming appliances for loan to his customers while their own appliances are in for repair should insure such items under the "Business Scheme" and not the "Commodity Scheme." This ruling also applies to any material which may be held by members (decorative lighting, etc.) for display or exhibition purposes.

In other words, the commodity insurance scheme is limited to goods for sale while the "Business Scheme" covers items of furniture and equipment and any appliances which are held for purposes other than sale.

Appliance Flexibles

The Association has been in negotiation with the B.E.A.M.A. and subsequently with the Cable Planning Officer of the Ministry of Supply in respect of appliances being supplied (*a*) without any flexible cord attached to them and without suitable provision for earthing; (*b*) with twin instead of three-core flex; and (*c*) with lengths of flex of 4 ft. and 6 ft., according to the nature of the appliances.

It is stated that with regard to (*a*) there now seems to be little cause for complaint in that reputable manufacturers in the event of supplying appliances without flex include the necessary provision for earthing. As to (*b*), inquiries among the membership seem to indicate that the supply of appliances with twin flex is now the exception rather than the rule and it seems that appropriate steps have been taken in that direction.

The problem with regard to (*c*) arises from anxiety to conserve raw materials. It has been pointed out that members frequently have to scrap the existing flex and attach longer lengths and the manufacturers, through the B.E.A.M.A., have made arrangements to provide longer lengths on request.

PERSONAL and SOCIAL

News of Men and Women of the Industry

ONE of the best known figures in the electrical industry, **Mr. J. Y. Fletcher,** recently completed fifty years' service with the General Electric Co., Ltd. To mark the event the managing directors, Messrs. A. H. Railing and Leslie Gamage, presented him, on behalf of the board, with a silver cigar box. For more than half of Mr. Fletcher's years of service with the G.E.C. he has been a member of the board and for over

Mr. Fletcher receiving his presentation from Messrs. Railing and Gamage

forty years he has been intimately associated with the sale, development and application of "Osram" lamps.

He was closely associated with the late Lord Hirst in the foundation of the E.L.M.A., and has always taken a prominent part in its affairs. He has served terms of office as chairman and has played an important part in the international trade arrangements conducted by the association. In addition to this he has for many years been treasurer of the E.I.B.A. and in this capacity he has shown all his customary energy and enthusiasm with considerable benefit to the Association. It will be remembered that he presented the Association with the penny collecting plates which are seen at most electrical social functions.

Many in the electrical industry will wish to offer Mr. Fletcher congratulations and hope that he will enjoy many more years of health and activity.

Mr. C. B. Mitcalfe Dale, M.I.A.E., has been appointed chief engineer of the Engine Division of the Brush Electrical Engineering Co., Ltd., and subsidiaries, of Loughborough, on the resignation of **Mr. H. V. Senior** who becomes consultant to the company. Mr. Dale joined Petters, Ltd., at Yeovil, as drawing office manager in 1934. He became chief designer in 1938 and was transferred to the Brush Company when Petters, Ltd., was acquired by that company in January, 1939. He was previously on the design staff of Ruston & Hornsby, Ltd., Lincoln. He was educated at Sherborne and Newcastle, and served his apprenticeship with the Wallsend Slipway & Engineering Co., Ltd.

Mr. D. S. Windle, who, as we have already reported, has retired from the position of borough electrical engineer at Grimsby, was recently presented with a silver salver by the staff and employees of the Electricity Department, and Mrs. Windle received a silver bon-bon dish. The presentation was made by Mr. G. W. Parker, who has succeeded Mr. Windle at Grimsby.

Sheffield Corporation Electricity Committee has recommended the appointment of **Mr. R. H. Coates,** chief technical assistant in the electricity undertaking, to the position of deputy general manager at a salary of £1,000 per annum, rising to £1,400. Mr. Coates, who is thirty-seven, served his apprenticeship with the Metropolitan-Vickers Electrical Co., Ltd., Manchester, and before going to Sheffield was with the Central Electricity Board.

Mr. T. C. Richardson, who recently retired from a senior position in the Testing Department of the North-Eastern Electric Supply Co., has been presented with a cheque by his colleagues. In making the presentation, Mr. E. Fawssett, engineer of the department, referred to Mr. Richardson's thirty-seven years' service, for twenty-one of which he had been in charge of installation, testing and maintenance of power metering over a large part of the company's area.

To mark the retirement of **Mr. Harry Webber,** Keighley borough electrical engineer, after 33 years' service, he was presented on August 26th with Savings Certificates. These had been subscribed for by the workmen and administrative staff of the Electricity Department. The

Left to right: Messrs. F. Acomb (charge engineer), H. E. Pickard (meter supt.), H. Dalton (mains supt.), E. Dadswell (maintenance engineer), H. Webber, M. Smith (consumers' dept.), C. B. Haraley (charge engineer) and A. Helliwell (senior charge engineer)

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presentation was made in the presence of the department heads by Mr. H. Dalton.

Mr. F. E. Butcher informs us that he has relinquished his position as chief electrical engineer to Black & Decker, Ltd., in order to take up an appointment with Rotax, Ltd.

A number of articles written by Mr. Butcher on subjects relating to factory installations and equipment have been published in the *Electrical Review* at various times.

Mr. A. H. Langley, Ph.D. (Eng.), A.M.I.E.E., senior lecturer in electrical engineering at the Wigan Mining Technical College, has been recommended for the position of head of the Electrical Engineering Department of the Sunderland Technical College rendered vacant by the retirement of Mr. W. T. Maccall.

Mr. J. Eriksen has been appointed a director of the Express Lift Co., Ltd. He has been works manager since November, 1938.

Obituary

Professor F. Bacon.—The death occurred on August 23rd, at the age of sixty-two, at Newbury, of Mr. Frederic Bacon, A.M.Inst.C.E., M.I.E.E., M.I.Mech.E., Professor of Engineering at University College, Swansea. Professor Bacon was educated at Trinity College, Cambridge, where he gained first-class honours in the Mechanical Sciences Tripos. He served in various engineering works, including those of Yarrow & Co. at Poplar and the Trafford Park works of the British Westinghouse Electric & Manufacturing Co.

He was demonstrator and lecturer in applied mechanics and electrical design at the Royal Naval College, Greenwich, from 1905 to 1913, and was also lecturer in photo-microstructure of metals at University College, London, from 1910 to 1912. He was appointed Professor of Engineering at University College, Cardiff, in 1913.

During the last war Professor Bacon served as a lieutenant, R.N.V.R., in the Paravane Department at Portsmouth Dockyard, and was also employed at the Admiralty as technical expert in the experimental development of anti-mine and anti-submarine devices. He was appointed to the chair of engineering at University College, Swansea, in 1920. He was the author of a number of papers on scientific and technical subjects.

Mr. G. C. McLean.—We regret to announce the death, on August 29th, of Mr. G. C. McLean, engineer and manager of the Inverness Corporation Electricity Department. He was only forty-nine years of age; he was taken ill while on holiday a fortnight ago and died in a Glasgow nursing home. Mr. McLean went to Inverness sixteen years ago as assistant electrical engineer and manager and succeeded the late Mr. C. A. Grant as chief of the undertaking.

Mr. S. Pedelty.—The death has occurred at Ryhope, Co. Durham, of Mr. Simon Pedelty, chief engineer for ten years with the Stella Coal Co., Ltd., and a pioneer in the electrification of collieries. He was seventy-seven years of age.

Mr. A. Staines.—We record with regret the sudden death of Mr. Arthur Staines on August 16th at the age of sixty-one ; he had served forty-two years continuously with the British Thomson-Houston Co., Ltd., first at Rugby and later at the Willesden Works. He had a wide circle of friends within the BTH organisation and in the electrical manufacturing industry, to whom his unexpected death came as a profound shock.

Mr. James Boyd Shield, late joint managing director of Anderson, Boyes & Co., Ltd., mining engineers, Motherwell, has died at Edinburgh at the age of sixty-seven. In his early days Mr. Shield was with Mavor & Coulson, Ltd., Glasgow, joining Anderson, Boyes & Co. in 1907. He retired from active participation in the business in 1933. He was a member of the Institutions of Electrical and Mechanical Engineers. He is survived by two sons.

Mr. C. S. Robson.—The death is announced of Mr. Charles Stewart Robson, who was a director of Hick, Hargreaves & Co., Ltd.

Mr. R. H. Dickinson, whose death at the age of eighty-eight is reported, was formerly chief engineer of the Birmingham Corporation Tramways.

Red Cross Appeal

Fourteenth List of Subscriptions

THE organisers of the Electrical Industries Red Cross Appeal have sent us a further list of covenanted subscriptions and donations from organisations and individuals in the various branches of the electrical and radio industries. This, the fourteenth list, printed below, raises the total amount received so far to £17,220.

Covenanted Subscriptions

	Gross Annual Amount £ s. d.
Brought forward ..	10,430 6 0
Ferranti, Ltd.	200 0 0
Kolster-Brandes, Ltd.	100 0 0
Booth & Bomford, Ltd.	25 0 0
Lowe & Oliver, Ltd.	6 6 0
Fred. G. Alden, Ltd.	6 6 0
W. J. Williams	2 2 0
Albert E. Hadley	2 2 0
Total	£10,772 2 0

Donations

	£ s. d.
Brought forward ..	£6,218 9 3
Electrical Association for Women	200 0 0
Hill, Upton & Co., Ltd. ..	10 10 0
A. Warren & Sons, Ltd. ..	10 0 0
David Thomson & Sons	5 0 0
Manor Electric Oven & Fire Co.	2 2 0
Electrical Apparatus Co., Ltd. ..	1 5 0
E. C. Neate (c/o Riley & Neate)	1 1 0
Total ..	£6,448 7 3

Manchester A.S.E.E. Meeting

The Manchester Branch of the Association of Supervising Electrical Engineers is holding a meeting at the Engineers' Club, Albert Square, at 4 p.m. on Saturday, September 18, when Mr. C. R. Goldring, of Hale, is to speak on " Hydro-Electric Power in Canada."

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Training for Higher Posts

WITH regard to Alderman Walker's letter in your issue of August 20th, I would go farther than his suggestion that each supply company should train certain selected men for the higher posts in the industry and propose that the supply industry as a whole should organise a comprehensive training scheme to ensure that men are available to fill these posts.

Fellowships to the value of, say, £400 per year could be awarded to selected men who had had a sound university education and spent one or two years in the supply or manufacturing industry; these would enable the men to obtain the requisite training in the various branches of the supply (and possibly the manufacturing) industry. The training would not normally be obtained with a single company and it would occupy a period of one to two years; it would then be followed by six to twelve months abroad in obtaining experience with one or more of the larger American or European companies. Included in the training should be advanced theoretical courses in the relevant technical and economic problems which cannot be included in an ordinary undergraduate course; this would be carried out at universities or technical colleges with assistance from the industry in the form of special lectures and the provision of the necessary laboratory equipment.

The scheme could be administered by a committee representing the supply industry and the universities; its cost may, at first sight, appear to be heavy but would actually be insignificant when compared to the capital invested in the industry and when viewed in the light of the benefits which would result.

Edinburgh. E. OPENSHAW TAYLOR.

Thermoplastic Cables

THE letter from the chairman of the Cablemakers' Planning Committee, in your issue of August 20th, overlooks the fact that the Cablemakers' (War Emergency) Technical Committee does not embrace all manufacturers of thermoplastic covered wires and cables and so does not represent the British cablemaking industry as a whole from the technical standpoint, so far as polyvinyl chloride as insulation is concerned.

In wartime, the value of the contributions of a branch of an industry cannot be measured solely by the volume of its output, as the thousands of small requirements of the Service Ministries are spread over a large number of small manufacturers. A small delivery made by one of these for a vital war job can be of greater importance than one delivery of a million yards of a simple lighting wire. The mentioning of these facts is only a matter of fairness towards those firms in whose small workshops a great amount of development work has been done for many years, which has incited and helped the British chemical industry to commence the manufacture of the raw materials just in time to meet demands when rubber stocks were getting low. It is therefore to the credit of the plastics industry, led and supported by the Plastics Controller of the Ministry of Supply, that a serious gap can to-day be filled without great difficulties. The electrical industry as a whole owes a great deal to this Department which, up to the end of last year, controlled not only the raw materials but also the finished products, *i.e.*, everything which had been developed and made from P.V.C., including wires and cables.

It is not the right moment to quarrel about the question of whether rubber will come back or whether P.V.C. will survive. Our only aim should be to make the best use of P.V.C. for every possible and suitable application in order to relieve the seriousness of the rubber situation.

The last paragraph of the letter referred to might give the impression that P.V.C. is only in its infancy. Actually it is already dealt with in many Government specifications and has been used for defence work in the air, on land, and in the sea. Practice has already proved where it is and is not a suitable substitute for other materials. The knowledge of P.V.C. in the technical departments of the three Service Ministries is already very great, due to the progressive outlook of their officers and their co-operation during the last few years with every manufacturer with experience. The number of experts with practical and theoretical experience of P.V.C. is not confined to the members of one committee.

Finished products are to-day controlled by the Cable Planning Officer of the Ministry of Supply, and the regulations issued by this Department, worked out in the closest co-operation with the Service Ministries, state clearly where rubber has to be used and where P.V.C. shall, or shall not, be used, so that the existence of any private advisory body is unnecessary. In any doubtful cases it will always be best to seek the advice of a Government Department which, if it should require further advice, will naturally go to those who have proved themselves able to help them.

The statement that P.V.C. cables and flexibles will give satisfactory service under most conditions as substitutes for war-

emergency rubber cables for general wiring work ignores the excellent properties of P.V.C. for a great number of applications. By suggesting that P.V.C. can be considered as a substitute for another war emergency product, it is liable to create the wrong impression that a P.V.C. cable is an inferior product which is only good enough for wartime conditions with a short life. Numerous quantities of wires and cables covered with oil- and petrol-proof, non-ageing and non-inflammable P.V.C. have proved their properties for numbers of applications under the most severe conditions. The conclusion must be that a cable which will stand up to war conditions must be at least good enough for its peace-time suitability to be investigated.

Just as the war has forced cablemakers to step into plastics, so it has forced purely plastics firms into cablemaking, and the fight "rubber *v.* plastics" should be postponed until the war has been won, as a result of the co-operation between everyone who is able to add his contribution. J. F. KENURE,

Feltham, Mdx. *Managing Director,* Duratube & Wire, Ltd.

London Transport "C" Stock

MAY I point out an error in the reasoning outlined by the reference to the above-mentioned stock in your issue of August 20th.

After suggesting a case for its ranking with the Metropolitan Water Board, Central Electricity Board and such bodies you say that, should it be given the rank of Public Board securities, "it is conceivable that current prices are warranted." Why only current prices if the stock is given that rank, since the other stocks referred to are around par? Particularly as there are so many reasons why the "C" stock must eventually receive its "standard" rate, that is, an appreciably higher rate than that now paid.

At its present price of 67 the return is a full 1 per cent. more than on the other stocks irrespective of any consideration of the strong case for eventual improvement in dividend.

Hornchurch, Essex. A. W. WOODWARD.

Post-War Electricity Supply

WHILST there is much with which one can agree in the E.P.E.A. report reviewed in your issue of August 27th, it would appear that unfair comparisons have been made as between local authority and company undertakings. Company undertakings have pioneered much of the development work in years gone by and, in general, have had some very sparsely populated areas to deal with.

In Section 14 of the Report it is stated that "on the whole, in comparable areas, they [the local authorities] provide cheaper electricity than, and carry out their functions as efficiently as, power companies." This may be true up to a point, but most local authorities have interested themselves only in comparatively small rural areas which could be conveniently electrified on lines already indicated by the experience and pioneer development work of the company undertakings. Furthermore, it must be remembered that the power companies have had to face greater financial risks; the Yorkshire Electric Power Co., for example, operated from 1901 to 1914 before conditions warranted paying a first dividend of 2 per cent!

The articles in the *Electrical Review* of August 20th and 27th, on "Rural Development," are timely, giving as they do some idea of the magnificent work carried out by the Y.E.P. Co. on behalf of its subsidiary undertaking. It so happens that I was associated with the planning of the original distribution scheme for North Lincs., and therefore appreciate the success attained in what at one time appeared to be a rather unpromising area.

If complete control of all future electrical development is to pass into the hands of "some body in London," due recognition should be afforded the power companies when considering the constitution of that body, in order that their vast experience of rural electrification problems may be utilised for the general good.

Liverpool. HERBERT J. FRASER, A.M.I.E.E.

Lift Practice

MY attention has been drawn to an article which appeared in your issue of July 16th entitled "Electric Lift Practice" by Mr. L. W. Honey, and I feel obliged to direct the attention of your readers to some misconception in the mind of your contributor as to the purpose of the Code of Practice for electric passenger and goods lifts and escalators, which was recently revised and issued by the Building Industries National Council.

The author of the article states that the Code of Practice "whilst providing a useful standard construction specification for use by architects, consulting engineers and manufacturers, does not deal with the standardisation of lifts in general." It was never, so far as I am aware, intended that this Code should be used as a standard construction specification; neither was it intended that it should deal with the standardisation of lifts. Its purpose is to provide reasonable safety for life and limb. In fact, the scope and purpose of the Code is clearly set out on page 5 of the revised edition.

The implication in the first paragraph of the article is that the B.I.N.C. did not complete its task when formulating this Code. It has never been the policy or practice of

the B.I.N.C. to intrude on the prerogatives of another body, and the proper authority to prepare a Standard Specification, whether for lifts or any other component part of a building, is the British Standards Institution, and there is little doubt that such a Specification will in due course be prepared by that body. In the meantime it is confidently believed that the Code will fill a long-felt want in defining the immediate requirements for a properly installed lift or escalator.

*London, W.C.*1. E. C. HARRIS,
Chairman,
Lift and Escalators Panel, B.I.N.C.

Motor Economies

YOUR contributor " Designer " stresses, in his article in your issue of August 20th, the point that when conditions allow, ventilated motors should be installed instead of totally-enclosed machines. From the context it appears that " ventilated " refers to " open " or " protected " ventilated machines, which should be used in preference to totally-enclosed motors in order to save materials, the inference being that the latter type of motor must needs be heavier than the former.

This is a somewhat sweeping statement which, without qualification, is surely misleading, since relative saving in materials revolves purely on the question of economical design. An economically designed squirrel-cage induction motor of the totally-enclosed, surface-cooled type compares very favourably with its equivalent of the protected-ventilated construction when allowing for temperature rises in both cases as specified in B.S.S.168, *e.g.*, a well-known firm of manufacturers gives the weights of its protected-ventilated type as follows:—For 1½-HP, 1,450 RPM, 78 lb. and for 7½-HP, 1,450-RPM, 230 lb., against 60 and 207 lb. for totally-enclosed, surface-cooled machines of another company which makes that type only.

Yate, Bristol. NEWMAN INDUSTRIES, LTD.,
HEDLEY NEWMAN,
Assistant Managing Director.

Electric Trucks for Russia

AS part of Birmingham's share in the " Aid to Russia " movement, men of the Corporation Public Works Department have assisted in the construction of a number of " Electricar " works trucks, each capable of hauling two tons. This work has been carried out in the men's spare time under the leadership of Mr. H. Lovegrove, the deputy district surveyor, with the approval and encouragement of Mr. H. J. Manzoni, the city engineer and surveyor, and Mr. G. W. Chandler, divisional engineer. The first consignment recently completed was accompanied by the message " Good luck and speedy victory to our Russian comrades."

As the first line of these trucks emerged from the works they were inspected by the Lord Mayor of Birmingham (Councillor W. S. Lewis), who is the area secretary of the Electrical Trades Union, and later in the evening at an informal meal he congratulated both the regulars and volunteers, remarking how well the latter had profited by their training to become competent machinists.

These trucks, which were specially built to meet all the Russian requirements, are of the fixed platform type, vertical steering to two wheels and driven by tubular shaft coupled to a worm-driven axle through bevel differential gearing. Control is by hand giving three speeds forward and reverse, effected by cam and trigger operated contactors. All control gear is housed in the control column at the driving end of the truck. Solid rubber tyres are fitted to all wheels and the foot brake pedal interlocks with a main switch giving " dead-man " control.

The battery equipment is of the lead acid traction type of 253 Ah capacity, 14 cells. A feature of particular interest in view of the severe climatic conditions in which the trucks will operate, is the battery housing. This is of all-steel construction, specially lagged internally to withstand low temperatures, and these trucks under test operate perfectly between temperature ranges of plus or minus 40 deg. C. At 40 deg. C. below zero atmospheric temperature, the temperature of the battery and electrolyte fall only just below zero. The batteries are instantly removable for interchange and, as a spare battery unit is being supplied with each truck, vehicles can be operated for 24 hours each day.

The visit of the Lord Mayor to the works was concluded by an inspection of a new four-ton " Morrison-Electricar " refuse collector, which is to be used by the Birmingham Corporation for salvage work and forms an addition to the existing fleet of 130 refuse collectors of the same make.

The Lord Mayor of Birmingham inspecting the electrical equipment of an " Electricar " truck

COMMERCE and INDUSTRY

Women Electrical Workers. Welding Technique.

Men for the Mines

THE measures announced by the Ministry of Labour and National Service for "directing" men into the coal mines to make up the deficiency in production have been supplemented by an appeal to other men to go to the collieries. It is addressed to men between the ages of 16 and 41 without previous mining experience; those with experience will be accepted up to 50.

Every volunteer will receive at least six weeks' training above ground, at technical schools and other recognised centres. No man will be actually employed at the coal face until he has had at least four months' underground experience and training. Volunteers whose education is interrupted by service in the mines will be eligible for the same post-war training facilities as men in the fighting Services.

London Transport Workers' Wages

A claim for increased wages was recently put forward by the E.T.U. for its members on the generating and distribution staff (trams and trolley buses) of the London Passenger Transport Board. The Board offered an increase of 4s. 6d. per week for workers aged 21 years and over; 2s. 3d. for those between 18 and 21 years; and 1s. 8d. for younger workers. This was rejected by the employees' representatives on the ground that it would create a "differential" between the various sections of the Board's employees and the matter is being submitted to arbitration.

An offer of an increase of 5s. 6d. a week in the bonus of the adult railway electrical staff was accepted; the Union had claimed 10s. per week. This raises the weekly bonus to 20s. 6d.

E.T.U. Women's Section

The Electrical Trades Union announces the formation of a new section of the Union "designed to cater for women workers engaged in all departments of electrical work which, over a period of years, has been mainly carried out by female labour and which must be recognised as primarily women's work. This type of labour is auxiliary to skilled labour and is mainly of a repetitive character."

These women will pay fixed contributions and receive fixed benefits and will be eligible to hold certain offices in the Union. It is emphasised that women already registered as "dilutees" will not be admitted to the new section.

Aluminium Production in Tasmania

The Melbourne correspondent of *The Times* reports that Mr. J. A. Beasley, the Commonwealth Minister of Supply, recently announced that the Government had decided to manufacture ingot aluminium in Tasmania. He said that inquiries had indicated that the prospects of the supply of plant were brighter from the United Kingdom than from the United States. Rolling mills and extrusion and forging plants which were already in operation were being supplemented, and with the production of ingot aluminium the industry would be complete. The considerable power required would be supplied by the Tasmanian hydro-electric scheme. Though the tonnage which it was intended to produce could not be disclosed, it was proposed to provide £A3,000,000 to establish the ingot industry.

E.I.B.A. Donation Scheme

The E.D.A. Northern Counties Area Charities Sub-Committee is endeavouring to raise further funds for the E.I.B.A. and a shilling donation scheme is again being launched in connection with which many prizes have been contributed by manufacturers, contractors, wholesalers, undertakings and individuals in the electrical industry. The prizes number 97 to date and include electric kettles, electric clocks and electric irons, while the number of War Savings Certificates included in the prizes exceeds fifty. A shilling donation may well pay a handsome dividend and it is hoped that the electrical industry generally will support the scheme by applying for books of receipts to the Secretary, E.D.A. Office, 47, Pilgrim Street, Newcastle-on-Tyne.

Aid for Merchant Seamen

Particulars are given in a leaflet prepared jointly by the Ministry of Labour and the Ministry of War Transport of arrangements which have been made for the care of officers and men of the Merchant Navy who have been incapacitated by injury or disease—whether caused by enemy action or otherwise. It describes the treatment available under the Emergency Hospital Scheme and the training and resettlement of men who are disabled from returning to sea. The list of special training courses for disabled persons arranged by the Ministry of Labour includes electrical installation work, fitting, instrument making, radio fault finding and testing and electric welding.

Copies of the leaflet, P.L. 127/1943, are available from local representatives of the Shipping Federation, the National Union of Seamen, the officers' societies or from local offices of the Ministry of Labour.

G.E.C. Accessories Prices

The General Electric Co., Ltd., has prepared a booklet giving a complete list of revised prices for G.E.C. electrical accessories. The prices in the list include all advances and adjustments up to August 9th, 1943, from which date the revised prices operate. They refer to the material listed in the G.E.C. Catalogue S (1), 19th edition, dated July, 1938. Copies of the booklet can be obtained from Magnet House, Kingsway, W.C.2, or from any of the company's branches.

Irish Lamp Import Quotas

The *Board of Trade Journal* reports that the Senior United Kingdom Trade Commissioner in Dublin has forwarded a copy of a Notice (No. 440) issued by the Irish Revenue Commissioners, which states that the Government of Eire has made an Order suspending for the

period August 1st, 1943, to January 31st, 1944, the quota restrictions imposed by the Control of Imports (Quota No. 31) Order, 1936, as amended by the Control of Imports (Quota No. 31) (Amendment) Order, 1937, upon electric filament lamps.

E.D.A. Activities

To back up its national "prestige" advertising campaign the British Electrical Development Association has prepared a number of local advertisements and posters. As a measure of the success of advertising in the local Press, Mr. V. W. Dale, the assistant director and secretary, tells us that in the last few days orders for over 200 stereos have been received.

The Association, in co-operation with the Electrical Association for Women, has organised a one-day conference for senior demonstrators to take place at E.A.W. headquarters, 20, Regent Street, S.W.1, on Wednesday next, September 8th, commencing at 9.30 a.m. The speakers will be Mr. Dale, Miss Caroline Haslett, C.B.E. (director of the E.A.W.), Miss E. M. Eaves, Miss Willans, M.B.E., and Miss Minoprio. For the benefit of demonstrators who are able to stay in London on the following day, visits have been arranged to the staff canteen of Central London Electricity, Ltd., and British Restaurants at Finchley.

Developments in Luminescence

A lecture on "Recent Developments in Luminescence, with particular reference to Discharge Lamps," is to be given by Mr. A. H. McKeag, M.Sc. (G.E.C. Research Laboratories), at a meeting of the Institution of Electronics to be held at 3 p.m. on Saturday, September 18th, at the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2.

Payment of Wages during Sickness

Darlington Corporation is being urged to introduce a scheme for the payment of wages during sickness to workmen in trading departments similar to that introduced in non-trading departments.

Fatal Accidents to Children

An inquest was held at Bournemouth recently on a twenty-month-old boy who was killed when playing with an electric fire. The child's father, Mr. N. D. Shearing, a post-office engineer, said that the fire had not been used for two years. At Christmas time he removed the plug to use it for decorations and later refixed the plug to the fire, not knowing that it was wrongly wired, and put the wires in what he thought was the correct order. Mr. E. T. Grace, electrical engineer, stated that the positive and earth wires of the fire were connected with the wrong terminals, due to the fact that the person who fitted the flex to the fire had used the red wire contrary to the usual practice. It was the proper thing for Mr. Shearing to fix the red wire as he had done and unless the fire was tested there was nothing to show that it was wrong. A verdict of "Death by misadventure" was recorded.

A baby was also the victim in a case of electric shock inquired into at an inquest at Belfast. It was stated that the two-year-old boy, William Lemon, met his death by touching a live wire near the meter box, when playing in a neighbour's house. Evidence was given by Mr. T. Chambers that a wire had been disconnected from the switch on the consumer's side and fastened to the supply wire in such a way that part of the wire was exposed. He said that it was a half-done job. A verdict of "Accidental death" was returned.

A nine-year-old boy, Derek Alfred Dodman, of Whitby, Cheshire, received a fatal electric shock through falling on an electric wire extension from an office to a shed. He was believed to have been climbing a metal post to recover a whip from a clothes line.

Air-Raid Warden's Death

The need for cutting off the current at the main switch was emphasised at a Sunderland inquest on Robert Lowes (58), Sunderland, an air raid warden who was killed while moving a wire attached to a brick domestic shelter, in Henry Street East. It was stated that Mr. Lowes was told by neighbours that the walls of a shelter had become electrified. He called at the house and noticed that a wire from a bedroom window was attached to the top of the shelter. He disconnected the wire by striking it with a piece of wood. Later he took hold of the wire hanging from the window to attach it to another piece of wire and received a fatal shock.

Mr. P. H. Ridler, Sunderland Corporation Electricity Department, said there was a fault in a plug circuit at the back of the switch where the earth wire crossed the live wire. The rubber insulation of the live wire had been worn through and the earth wire had thus become charged. The earth wire was carried up the wall and had been connected to a water pipe on the outside of the wall. This wire had been broken and the end had been looped up and attached to the shelter. Unfortunately it had been fastened to the steel reinforcement of the roof, thus charging the shelter walls. A verdict of "Accidental death" was returned.

Killed While Inspecting Lamp

While searching for a fault in a portable electric lamp, a young turner employed in a Glasgow iron works received a fatal electric shock on August 27th. A workmate who witnessed the mishap pulled the plug from the switch box and artificial respiration was applied, but without success.

Ship Welding

Spot welding has hitherto been mainly applied to light-gauge metals, but developments that have been in progress at their Neptune Works for some years past have enabled Swan, Hunter & Wigham Richardson, Ltd., to disclose details of a method of "forged-spot" welding ship's components of considerable thickness with very large currents that are maintained for an appreciable time. Lengthy trials of the McBain welding head, in which some unusual constructional features are embodied, have shown that powerful clamping of the work during welding and subsequent pressure consolidation are major factors in securing reproducible welds of superior internal soundness without objectionable surface indents, making the joints pressure-tight and minimising electrode troubles.

The machine is energised with single-phase AC at 450 V through a water-cooled 650-kVA

horseshoe transformer, which is offset parallel to its arms, specially designed for the purpose by A. Reyrolle & Co., Ltd., and regulated by tapping switches on the primary side; the secondary output is at 8 to 22 V.

For joining two 1-in. thick plates 73,000 A, applied in a number of pulsations with a pressure of 11,500 lb. on the electrodes, is required for this method which is described in a paper (p. 9) issued by the Institute of Welding.

Another paper (p. 8) from the same source describes a method of fabricating bulkhead, deck and similar panels of ships, particularly oil-tankers, by means of high amperage welding in order to secure deep penetration, thus confining the welding to one side only and so obviating the need for turning over the structure while it is being fabricated.

Spot-welding Light Alloys

Previous investigations have proved that the average strength of a spot weld in light alloys is comparable with that of a rivet of equivalent size, although there are large divergencies in the shear strength of single and groups of welds. The values of static shear failing loads vary from a maximum of 29 per cent. above to a minimum of 12 per cent. below the average. Differences of this kind occur in welds made both with different machines and the same machine under given setting conditions. The reasons for them have been determined by further investigations which are described in the second interim report (R.20, price 2s.) of the R.52 Sub-Committee of the Institute of Welding.

Constructional Welding

Revision of BS.1071 for AC arc welding plant and equipment for heavy constructional work, which originally related essentially to transformers and reactors, has extended its scope to cover details of all the electrical equipment used for 300-A and 600-A welding in shipyards and similar heavy constructional work. Standard requirements have been included for welders' distribution boxes, condensers, plugs and sockets, and a particular kind of four-core cable that has been specially designed for this work.

Recommendations are also made with regard to the layout of installations and adequate earthing. This specification will be used by the Ministry of Supply as the basis upon which licences for equipment will be granted as well as for planning in advance the manufacture of component parts. Copies are obtainable from the British Standards Institution, 28, Victoria Street, London, S.W.1, for 1s. 3d., post free.

Post-war Homes

An exhibition of designs for a post-war housing estate submitted in a recent competition organised by the Incorporated Association of Architects and Surveyors closes to-day (Friday) at Selfridges, Oxford Street, London, W.1. Besides indicating errors of the past the display demonstrates various ways of planning housing estates, complete with communal facilities, and making use of the latest building methods and materials. Special attention has been paid to the possibilities of prefabrication which will enable houses to be erected in a matter of a few days. The actual exterior of a portion of a house incorporates many new features. An interesting section is devoted to Continental houses and flats. Among a display of building materials are new types of glass and various substitutes for wood, which is likely to be scarce immediately after the war.

South African Standards Institution

The annual meeting of the South African Standards Institution, which incorporates the South African Branch of the British Standards Institution, was held on June 24th. Professor John Orr, O.B.E., who has served as chairman since the inception of the standards movement in South Africa more than thirty years ago, was re-elected for a further term of office and Mr. W. Elsdon-Dew was re-elected vice-president. A list of the various sectional and sub-committees of the Institution is published in the *South African Mining and Engineering Journal*; these include the Electrical Engineering Committee, of which Mr. C. J. Monk is chairman and Mr. H. T. Aspinall, hon. secretary.

Trade Announcement

Rowlands Electrical Accessories, Ltd., inform us that owing to paper control a fresh issue of "Realumination" will not be made at present. The last-published edition is still current, subject to price advances for certain fittings, particulars of which are given in an amendment slip which the company is issuing.

Changes of Address

The Edison Swan Electric Co., Ltd., informs us that it has closed its Twickenham office and that all the staff there have now returned to the company's London office at 155, Charing Cross Road, W.C.2.

The Airedale Electrical & Mnfg. Co., Ltd., announces that it has opened its own London office at Windsor House, Victoria Street, S.W.1 (telephone: Abbey 3559), under the supervision of Mr. J. E. L. Blythe, sales director. Mr. A. McDonald of 86, Strand, London, W.C.2, has ceased to represent the company.

Horace Boot & Partners, Ltd., consulting engineers, have closed their office at Maidenhead, and all communications should be addressed to 22, Martin Lane, Cannon Street, London, E.C.4 (telephone: Mansion House 3501).

W. & E. Kupfer, Ltd., have removed to 11, Charlotte Street, London, W.1.

Change of Name

M.R.C., Ltd., has changed its name to Teleflex Products, Ltd.

TRADE MARK APPLICATIONS

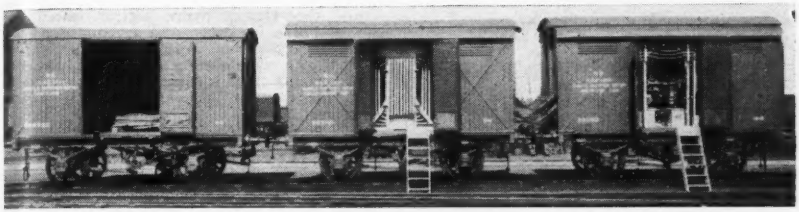
THE following applications have been made for British trade marks. Objections may be entered within a month of August 25th:

WINCHESTER. No. B608,059, Class 9. Electric batteries and B608,060, Class 11. Electric torches. Advertised before acceptance. —Western Cartridge Co., East Alton, Illinois, U.S.A. Address for service is c/o McKenna & Co., 14, Waterloo Place, Pall Mall, London, S.W.1.

Mobile Railway Substations

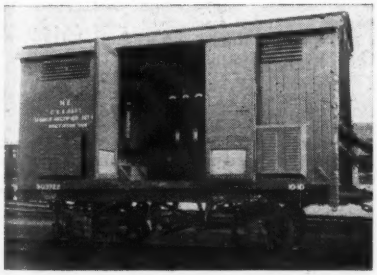
Electrical Equipment Mounted in Goods Wagons

TO supply electricity to the main locomotive, carriage and wagon works and for general railway purposes in the event of air-raid interference with local substations, the L.N.E.R. has built a number of mobile rectifier and transformer sets. The electrical equipment is mounted in standard 12-ton covered goods wagons, which have been modified by strengthening the floors and providing ventilating openings at the cant rail and elsewhere.



Complete mobile set showing wagons for carrying cable, etc. (left); transformer (centre); and rectifier (right) with anode connections from transformer van

Each mobile rectifier unit is rated at 500 kW and consists of a transformer and two pumpless steel-tank rectifiers, together with high- and lower-voltage switchgear. The rectifiers can be connected in series or parallel to provide a three-wire or two-wire DC supply. The transformer with its high-voltage switchgear is housed in one wagon and the rectifiers with the DC switchgear are mounted in another, which is semi-permanently coupled to the first. A third contains cables for making emergency connections, joint boxes, jointing material, etc.



Front of rectifier set, showing DC switchboard and part of steel-tank rectifier

Each mobile transformer unit consists of one 500-kVA transformer, together with the high-voltage switchgear to control the incoming supply and lower-voltage switchgear to control the outgoing AC supplies. In both the mobile rectifier and mobile transformer sets racks are provided to carry the spare high- and lower-voltage fuses.

The electrical equipment of the rectifier sets was supplied by the General Electric Co., Ltd., and that of the transformer sets by Johnson & Phillips, Ltd., to the requirements of Mr. H. W. H. Richards, chief electrical engineer to the L.N.E.R. The alterations to the goods wagons were carried out by the staff of Mr. E. Thompson, the company's chief mechanical engineer. The wagons are painted the L.N.E.R. standard service vehicle dark blue with white lettering, and, stationed at strategic points on the system, are ready for use at a moment's notice.

Junior Institution Meetings

PROFESSOR C. A. Middleton Smith, M.Sc., LL.D., is to present a paper on "The New Civilisation in China" at an informal meeting of the Junior Institution of Engineers, 39, Victoria Street, S.W.1, on September 10th (6.30 p.m.). Professor Middleton Smith is known to readers of the *Electrical Review* for the articles on developments and prospects in China which he contributed over a period of many years.

Further meetings of the Institution are as follows: *September 24th*: "Daylight Illumination in Factories" by Mr. P. J. Waldram (vice-president); *October 1st*: Discussion on post-war problems; *October 8th*: "Economy in Fuel and Power" by Mr. W. A. Christianson; *October 15th*: "Research for Junior Engineers" by Flt.-Lt. R. A. Collacott, B.Sc.; *October 22nd*: "Mechanisation of Mines (with special reference to the present Wartime Demand for Coal)" by Mr. J. K. Davies; and *October 29th*: Exhibition of films "Transport of Power" and "And Now They Rest."

ELECTRICITY SUPPLY

I.M.E.A. Reorganisation Plan. Control at Burnley.

Aberdeen.—CALL FOR I.M.E.A. REPORT.—At its last meeting the Electricity Committee adopted a resolution urging upon the council of the Incorporated Municipal Electrical Association the necessity of issuing the report of its special Post-war Planning Committee for consideration by members at the earliest possible moment. The resolution, which was passed following consideration of a circular from the Town Clerk of Newcastle-under-Lyme, expressed the view that some form of reorganisation in the electricity supply industry was almost certain to be proposed by the Government to meet post-war conditions.

Burnley.—JOINT COMMITTEE PROPOSAL REJECTED.—A special committee of Burnley Corporation has recommended that the policy of the Electricity Department being controlled through its separate committee is the most efficient, and that no useful purpose would be served by a combined Power and Light Committee for gas and electricity. No change is therefore to be made.

Inverness.—CONFERENCE ON HYDRO-ELECTRIC DEVELOPMENT.—Representatives of local authorities and members of Parliament in the area affected by the Hydro-Electric Development (Scotland) Act, are to hold a conference at Inverness on September 9th. The conference has been called by Inverness Town Council following a suggestion made by Sir Murdoch Macdonald, M.P. Most of the Town and County Councils in the area have agreed to send representatives and many of the M.P.s, who number about 20, will be present. The purpose of the conference is to set up, if so desired, a committee representing all the local authorities to watch and safeguard the interests of the area.

Sheffield.—LOANS.—The Electricity Committee is seeking sanction to pay out of the anticipated surplus sums of £5,000 for meters and current transformers, £500 for land for substations, £1,000 for substation buildings and £500 for hire apparatus.

SUPPLY TO WORKS.—The Electricity Committee has made an agreement with William Jessop & Sons, Ltd., for the supply of electricity and apparatus.

Overseas

India.—POWER SUPPLY TO PONDICHERRY.—It is reported in the *Indian Textile Journal* that Pondicherry is to receive an electricity supply from the Madras Government's Mettur power house, the main object being to increase the output of French India's textile mills and Fighting French co-operation in the war effort.

Northern Ireland.—BELFAST COAL SUPPLIES.—The *Northern Whig* reports that the Ministry of Commerce has made arrangements for an expert from collieries in England to visit Belfast in connection with the coal supplies being received by the Corporation Electricity Committee. The Committee has complained for a long time about the qualities of coal received, and the city electrical engineer has been instructed to confer further with the Coal Controller.

Spain.—NEW OUTDOOR SUBSTATION.—According to the Spanish journal *Metalurgia y Electricidad*, an important new outdoor substation has recently been completed near Madrid by the Sociedad Saltos del Duero to meet the increasing demand for power supply in the Spanish capital. It is designed eventually to accommodate plant to step down the power from four incoming 138-kV transmission lines from the Duero hydro-electric installations about 190 miles away. So far one 138/46-kV transformer, one of 46/15-kV, and one 15-kV, 20,000-kVA synchronous condenser have been installed and three further sets are to be added. The plant is of American General Electric manufacture.

RADIO and TELEPHONY

Great Britain. — WIRELESS LICENCES. — *The Times* reports that the total number of wireless receiving licences in Great Britain and Northern Ireland is now well over 9,250,000.

Madagascar.—PROSPECTIVE TELEPHONE DEVELOPMENT.—The 1941 report on telegraph and telephone services in Madagascar and the nearby islands of Réunion and Mauritius states that, chiefly owing to petrol rationing, telephone calls increased by 67 per cent. during the year. Under existing conditions it was not possible to meet all the demands for the connection of new subscribers, but as soon as the war is over and normal conditions prevail once more it is considered that there will be important developments in the country's telephone service. The report, which is reviewed in the *Journal des Télécommunications*, states that the length of the telegraph lines at the end of 1941 was 10,447 miles as compared with 10,298 miles at the close of the preceding year. There were twelve telephone exchanges with 7,761 miles (7,129) of overhead lines and 1,719 miles (1,685) of underground lines.

Switzerland.—TELEPHONE PROGRESS.—The *Journal des Télécommunications* reports that at the end of 1942 there were 946 telephone exchanges in operation in Switzerland, of which 804 were automatically and 142 manually operated. The number of subscribers' telephones in use increased during the year from 491,308 to 523,440 and the number of public call offices from 6,253 to 6,390.

TRANSPORT

Spain.—TWELVE-YEAR PLAN.—The official German news agency reports from Madrid that the Spanish railway network will be extensively electrified over a period of twelve years. The plan includes 4,000 kilometres of single track railway line. To start with 340 kilometres will be converted yearly. The cost is estimated at about 1,600 million pesetas.—*Reuter's Trade Service.*

Women Engineers

Examples of Skilled Work in War Industries

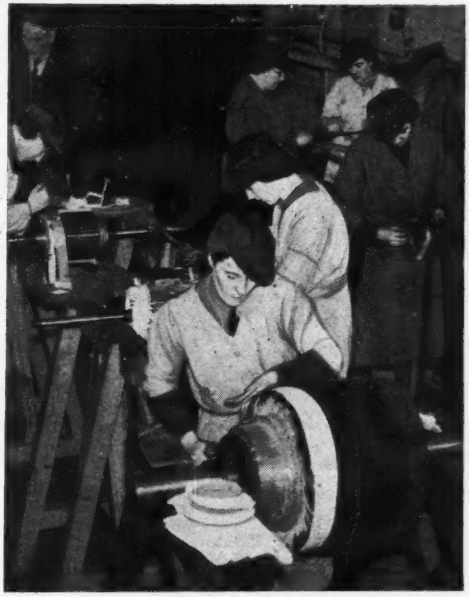
FROM time to time, in the *Production and Engineering Bulletin* issued by the Ministries of Labour and Production, articles are published illustrating the successful manner in which women are to-day carrying out skilled work in vital war industries after a period of training at Government centres. It has been emphasised that even where at first sight a job appears to be beyond a woman's strength the provision of lighter tools and special equipment may bring it within her capacity.

In the August issue of the *Bulletin* many examples are given of the work which women are doing in tank construction—much of which is of a heavy nature—the building of aircraft, various tasks in the electrical departments of naval dockyards, in railway workshops, a special part-time factory started by London Passenger Transport Board and a cable-making factory.

Because there is no heavy cutting load to counteract, and thus no heavy saddles and tables to be moved by hand, flame cutting is especially suitable for women and has been introduced extensively in the production of tank sprockets. The forged cylinder is rotated slowly and rings are cut off by the impinging flame with greater speed and less waste of material than could be attained in the lathe. An illustration shows a girl operating a duplex vertical boring and turning mill to turn, bore and recess the tank sprockets. A woman is also seen removing any sharp edges with the aid of a portable power-driven grinder, and others are using two- and four-flame "Shorter" units which both heat and quench the teeth so that hardening can be controlled rapidly and completely.

Instances of precision work by women and girls are the boring of track suspension levers and grinding (to 0·0005 in.) of louvre pins, and in each case the woman operator does her own setting. Women are shown milling track shoes, turning exhaust manifolds, and planing louvre supports to profile gauges and milling teeth in driving hubs, using an indexing fixture with the work axis vertical instead of horizontal as is more usual.

Much of the fitting work is of a heavy nature, but this is largely overcome by the provision of adequate handling tackle. One rather heavy operation which they are now doing is the bedding of the cupola race ring to the top plate of the turret. Women fitters are employed on the marking-out table, using scribing blocks and vernier height gauges according to the class of work. Other tasks performed include hand tapping of holes up to ½ in. diameter in armour plate,



Coil and armature winding in progress in a dockyard electrical department

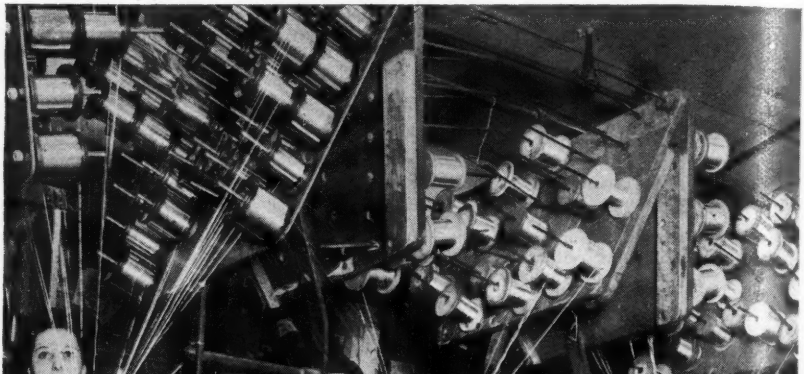
and it is stated that considerable reductions of tap breakages were noticed when women started on this job.

An Underground Factory

Another series of photographs shows women and girls performing diverse tasks of a fitting and repair nature in railway workshops. Also associated with transport—although producing aircraft parts—is a special factory which has been started by the London Passenger Transport Board in some disused passages of an "Underground" station. It is manned by the railway staff doing part-time shifts after normal hours. The work includes the production of complete instruments, including all machining operations and assembly, and some intricate

electrical wiring. The winding of coils for dynamo equipment and the assembly of fuse bases are also now being undertaken. One of the photographs shows a girl, who is a typist in the daytime, engaged upon slotting screws for aircraft.

Started in June last year with only some ten or eleven workers per evening, the factory has expanded so that in the last week for which figures are available the total number of hours worked was nearly 3,000.



Women operating stranding machines at a cable-making works (*Johnson & Phillips, Ltd.*)

Ships' Electrical Equipment

In the same issue women are shown working on electrical equipment at naval dockyards. At the training section in the electrical department they are given instruction in all classes of ships' electrical equipment, including such items as submarine detecting apparatus.

A machine shop is staffed largely by girls trained at a Government centre. Coil and armature winding is now done extensively by women and illustrations show some of the work in progress. Winding for motors under 25 HP is carried out almost exclusively by women workers.

Cable-Making Factory

At a cable-making works women, besides being employed upon the actual cable processes, are also engaged upon boiler maintenance. In the boiler house, working one at a time throughout the twenty-four hours, are three women whose duty it is to mind two boilers and control the steam pressure and pumps. They have been trained by the engineer in charge, but he is only there during the day.

Throughout the works the extent of female dilution is now 35 per cent., many of the women being part-time workers. By starting early a very good type of worker has been obtained and women are allowed to take a full share of responsibility. It is stated that an easy approach to the management through the woman assistant employment officer is probably the secret of the good spirit that prevails throughout the works.

All types and sizes of cables are made and women take charge of complete processes, such as varnishing, braiding or plastic sheathing. In the braiding shop when steel wire braiding is in progress one woman has charge of four machines and for cotton braiding one woman is responsible for a battery of 42 machines. Many cables are now finished with a plastic sheathing. Raw plastic is fed into a machine that heats it, reduces it to a putty-like consistency, and then forces it by point-and-die method on to the cable that is passing slowly through. In the plastic shop the employees are mostly women and they are also to be found in the test and repair shop where any fault in the insulation is rectified by skilled women repairers.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Thorn Electrical Industries, Ltd.—Speaking at the company's annual meeting on August 27th, Mr. Jules Thorn, chairman and managing director, said that the normal sales of "Atlas" lamps had progressed and the company had continued successfully the production of special lamps for the Services. They had successfully maintained quality in the face of serious production problems. As regarded overseas trade, they had received a satisfactory share of the export quotas which had been established.

There had been little change since the preceding year in the production and sale of Ferguson radio receivers for the commercial market, but they had been fully occupied with the production of radio equipment for the Services. The work which they were now doing was proof of their ability to meet post-war conditions.

The net earnings were very little different from those of the preceding year, but increased provision for taxation had somewhat reduced the amount available for distribution. The directors had always pursued a conservative dividend policy and there was now a total unappropriated reserve of £126,138 and current assets showed a large surplus over current liabilities.

The Engineering & Lighting Equipment Co., Ltd., held its annual meeting on Monday last, when Mr. S. A. Marples (chairman) presided. In his statement, issued with the accounts, Mr. Marples said that in spite of the lower proportion of skilled to unskilled workers there was a further increase in output during the year. The Joint Production and Advisory Committee formed last year had continued its regular meetings and had proved of great value in practical suggestions for improvements in efficiency and conditions.

While there had been some diminution in the output of lighting equipment, the department had continued its research work and the company would be placed in a favourable position to take care of the considerable post-war developments which could be confidently expected. The company claimed to be among the pioneers of the plastics industry and had the benefit of over fifteen years' experience in the moulding of synthetic materials.

During the year 5,431 of the 7 per cent. redeemable preference shares had been redeemed at a cost of £6,700 met from the redemption fund.

A. C. Cossor, Ltd., held their annual meeting on August 26th when Mr. T. A. Macauley (chairman) said that while it had been and continued to be the policy of the board to strengthen the company by pursuing a conservative dividend policy they nevertheless felt justified in recommending an increase in the dividend on the ordinary shares. They therefore proposed to pay a final dividend of 7 per cent., free of tax, making a gross distribution for the year of 20 per cent., as against 15 per cent. in the preceding year.

They were sure, he said, that the company's reputation for high-grade scientific apparatus had been greatly enhanced as the result of their wartime endeavours. In this he referred more particularly to the outstanding accomplishments of their research department, the results of which would be reflected in the company's post-war expansion policy on devices which would find a market in every part of the world. Reference was made in last year's report to the acquisition by their main subsidiary, the Sterling Cable Co., Ltd., of 90 per cent. of the share capital of Lancashire Cables, Ltd. Their holding in the latter company now totalled 95 per cent. Since the date of the balance sheet now before shareholders they had disposed of their interest in their entirely owned subsidiary, Sterling Batteries, Ltd., on terms favourable to the company.

At the conclusion of his statement, Mr. Macauley said that the negotiations which had been taking place with another radio company were now in abeyance and that the suspension of negotiations would in no way detract from the company's strength and prosperity.

Richardsons, Westgarth & Co., Ltd., report that negotiations with the Inland Revenue authorities have now reached the stage at which it is possible to make a reasonably accurate estimate of the E.P.T. liability. The company is now able to issue the accounts for 1940-41 and 1941-42 as well as for the year ended March 31st last. The trading profit and other income, after tax, in the past year, amounted to £116,588. This compares with £106,300 in the preceding year and £118,569 for 1940-41. The corresponding net figures were £44,411, £35,402 and £48,113, respectively. The dividend in the past two years was 8 per cent. per annum and in 1940-41 the payment was 7½ per cent. During the past year £271,868 debenture stock was converted into ordinary shares and the ordinary capital was thus increased from £612,812 to £884,680 and with the annual drawings for redemption the debenture stock outstanding is now reduced to £168,206. Holders of the increased capital participate in the proposed dividend for the year. The possibility of paying off the remainder of the debentures is under consideration.

James Howden & Co., Ltd., held their annual meeting on August 27th, when the chairman, Mr. Crawford W. Hume, presided. The chairman's statement, which was circulated with the accounts, said that the general reserve had been raised to £120,000 and the total reserves and undistributed profits now stood at £151,277. During the last three or four years the order book had continued to grow and reach new records. This year it still showed a satisfactory increase.

The British Power & Light Corporation, Ltd., is maintaining its interim ordinary dividend at 2 per cent., payable on October 1st.

Vactric, Ltd., is paying an interim dividend of 7½ per cent., less tax. The last distribution was an interim dividend of 4 per cent. in respect of 1937-38.

W. Canning & Co., Ltd., are again paying an interim dividend of 5 per cent.

Telephone Rentals, Ltd., is maintaining its dividend for the year at 10 per cent., less tax, by a final payment of 6 per cent.

Davis & Timmins, Ltd., are again paying an interim dividend of 10 per cent.

New Companies

Victory Appliances, Ltd.—Private company. Registered August 21st. Capital, £100. Objects: To carry on the business of manufacturers, fitters and repairers of, and dealers in, cooking ranges, ovens, stoves, grillers, cooking appliances, furnaces, boilers and heating apparatus, mechanical, electrical and gas engineers, etc. Directors: E. S. Davies, 6, Courtlands Drive, Watford; F. G. Wells, and R. G. Horton. Registered office: 58, High Street, Watford, Herts.

Brandon Electrical Engineering Co. (Leeds), Ltd.—Private company. Registered August 23rd. Capital, £1,000. Objects: To acquire the business of an electrical engineer carried on by Alice Cameron at 2a, Brandon Street, Armley Road, Leeds, as the Brandon Electrical Engineering Co., and to carry on the business of electrical, radio and motor engineers, etc. Directors: J. Cameron and Alice Cameron, both of 230, Dewsbury Road, Leeds. Registered office: 63, Great George Street, Leeds.

Spherical Valves, Ltd.—Private company. Registered August 25th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, microphones, gramophones, dictaphones, radio sets, picture and sound producing, reproducing and transmitting apparatus, valves, electrical apparatus, etc. Directors: B. Gold, 14, Cheyne Walk, Hendon, N.W.4, and W. Barr, 8, Balnacraig Avenue, Neasden, N.W.10. Registered office: 17/19 Stratford Place, W.1.

Companies' Returns

Statements of Capital

Crampton & Co., Ltd.—Capital, £2,500 in £1 shares. Return dated July 28th, 1943. All shares taken up. £2,500 paid. Mortgages and charges: Nil.

Automatic Internal Telephones, Ltd.—Capital, £5,000 in £1 shares. Return dated March 24th, 1943. All shares taken up. £5,000 paid. Mortgages and charges: Nil.

Croydon Cable Works, Ltd.—Capital, £170,000 in £1 shares. Return dated March 24th, 1943. 700 shares taken up. £700 paid. Mortgages and charges: Nil.

British G.W.Z. Battery Co. (1939), Ltd.—Capital, £10,000 in £1 shares. Return dated May 31st, 1943. All shares taken up. £10,000 paid. Mortgages and charges: Nil.

Oliver Electrical Supplies Co., Ltd.—Capital, £100 in £1 shares. Return dated February 26th, 1943 (filed June 2nd, 1943). All shares taken up. £100 paid. Mortgages and charges: Nil.

Electrical Screw, Ltd.—Capital, £12,000 in £1 shares. Return dated July 11th, 1942 (filed June 29th, 1943). 10,070 shares taken up. £10,070 paid. Mortgages and charges: Nil.

Electroway Heaters, Ltd.—Capital, £5,000 in 3,000 ordinary and 2,000 6 per cent. preference hares. Return dated March 18th. 3,000 ordinary and 990 preference shares taken up. £3,990 paid. Mortgages and charges: Nil.

Alton District Electricity Co., Ltd.—Capital, £35,000 in £1 shares. Return dated March 18th. All shares taken up. £35,000 paid. Mortgages and charges: Nil.

Mortgages and Charges

Small Electric Motors, Ltd.—Mortgage and charge on freehold factory premises at Church Fields Road, Beckenham, and the company's undertaking and other property, present and future, including uncalled capital, dated August 12th, 1943, to secure all moneys due or to become due from the company to National Provincial Bank, Ltd.

Thorpe & Thorpe, Ltd.—Mortgage and general charge on the company's undertaking and property, present and future, including uncalled capital, dated July 31st, 1943, to secure all moneys due or to become due from the company to National Provincial Bank, Ltd.

Rediffusion, Ltd.—Mortgage and general charge on leasehold factory premises at Broomhill Road, Wandsworth, S.W.18, and the company's undertaking and other property, present and future, including uncalled capital, dated August 12th, 1943, to secure all moneys due or to become due from the company to National Provincial Bank, Ltd.

Peto Scott Electrical Instruments (Holdings) Ltd.—Mortgage and general charge on the company's undertaking and other property, present and future, including uncalled capital, dated August 10th, 1943, to secure all moneys due or to become due from the company to National Provincial Bank, Ltd.

Electrical & General Accessories (Leicester), Ltd.—Mortgage, dated July 31st, 1943, to secure £550, charged on 150, Brickhouse Lane, West Bromwich. Holders: Tipton & Coseley Permanent Building Society.

Western Telegraph Co., Ltd.—Satisfaction to the extent of £818,675 (amount issued) on June 30th, 1943, of trust deeds dated June 20th, 1900, January 15th, 1902, and January 27th, 1910, and registered August 19, 1901, January 23rd, 1902 and January 29th, 1910, respectively, securing £1,039,650 debenture stock.

Liquidations

Kolster-Brandes, Ltd.—Meeting at St. Margaret's Works, St. John Street, Leicester, on Friday, October 1st, to receive an account of the winding-up of the company by the liquidator, Mr. W. J. Bull.

Radio Service Co. (Reading), Ltd.—Particulars of claims by September 13th to the liquidator, Mr. A. W. Hunter, 185-188, High Holborn, London, W.C.1.

Bankruptcies

A. Lawrie (Houchin & Lawrie), electrical engineer, 9, Melbourne Parade, Palmer's Green, Middlesex.—Application for discharge to be heard on October 1st, at the Court House, Upper Edmonton, N.8.

STOCKS AND SHARES

TUESDAY EVENING.

AN outstanding feature of the Stock Exchange markets is the readiness with which industrial stocks and shares are absorbed by capital requiring employment. Money appears to be plentiful enough, judged by the ease with which securities are placed when they come on offer. Yet it cannot be said that the income derivable from Stock Exchange securities is particularly tempting. The weekly lists given here embrace about 150 quotations. All but a very few of the stocks and shares are in receipt of dividends or interest. Yet from not more than a score can there be obtained a return of over 5 per cent. on the money. War conditions are largely responsible for this state of affairs, but there is also a cheerful optimism regarding post-war prospects, and the war news is regarded with quiet satisfaction.

Metropolitan Assented

No interim payment will be made upon Metropolitan assented stock in respect of the current year. The stock is secured by trust deed upon £4,400,000 London Passenger Transport "C" stock which was issued to the trustees by virtue of their holding of Metropolitan Railway consolidated stock. Of the Metropolitan assented stock there is £6½ million outstanding; the price in the market is 66½. For the whole of last year, 3¼ per cent. was paid, which affords a yield of £4 17s. 9d. per cent. on the money. The interest of 3¼ per cent. per annum is guaranteed for fifteen years from July, 1933, and at 3 per cent. for ten years thereafter. Investment does not care as a rule for stock bearing interest which is liable to shrink. Although it is hoped that after the war the Metropolitan assented stock will receive more than the present 3¼ per cent. guaranteed interest, the future is too uncertain for this assumption to be regarded as safe.

Equipment and Manufacturing

Capital is flowing unceasingly into shares of the well-known equipment and manufacturing companies, a movement carried to such an extent that the yield obtainable from British Insulated ordinary, for instance, at the present price of 5½ is no more than £3 12s. 9d. per cent. Callender's are now £5, at which the shares pay a level 4 per cent. on the money. Henley's at 25s. 6d. give £3 18s. 6d. per cent. During the last few business days, considerable buying has taken place of General Electric ordinary, Siemens, Ever Ready and other shares in this class. Siemens went up to 34s. and reverted to 33s. 3d. The shares at the present price are amongst the few in this group which give 4½ per cent. return. Aron at 44s. are 1s. 6d. higher. Buyers admit that they are looking more to future than to present income, and this consideration is manifest in the prices which so many of the front-rank industrial shares have attained.

Good Markets

Electric Constructions, treading hard upon the heels of 50s., have gained a florin. Consolidated Signals responded to a small demand by rising 3s. 9d. to 5⅝; and Westinghouse Brakes are ⅛ up at 66s. 3d. Johnson & Phillips are a good spot at 70s. Associated Electrical Industries put on 1s. and Ever Ready rose 1s. 6d., under the continual pressure of investment buying. Tube Investments hardened to 92s. Vactric declared an interim dividend on its ordinary shares of 7½ per cent. in respect of the company's financial year that ends next March. The shares have been out of the dividend list since June, 1938, when they received 4 per cent. The announcement had been discounted in advance, and the price is unchanged at 13s. 9d. Crabtree hardened to 38s. 6d. There is a little business doing in Sun Electrical ordinary at about 9s. 4½d., and in Ultra Electrics at the advanced price of 8s. 6d. A one-sixteenth rise lifted Telephone Rentals to 12s.

Price Fluctuations

Investment turns away from Home Railway stocks: it will have none of them excepting the prior-charge issues. Southern 5 per cent. preferred has slipped back 30s. to 76½, London Passenger Transport "C" stock is lower at 67 after last week's 2 point fall. Actually the price is more like 66. The recent decline in Cable & Wireless stocks has gone no further: Globe Telegraphs are 1s. higher at 37s., the preference being 6d. down at 28s. 6d. Canadian Marconi are on offer at 10s.; the American and Canadian Stock Exchanges remain fidgety and depressed—by peace expectations! Calcutta Trams have gone back to 40s. 9d. In the electricity supply market, County of London, Midland Counties and Northmets rose 1s. This week's other changes are a few gains of 6d. each. The overseas section is distinguished by a further advance of ⅛ in Victoria Falls Power ordinary, the price now being 86s. 3d.

Cossor

A. C. Cossor's shares, which had been up to the neighbourhood of 25s., went back to 24s. on the statement of the company's chairman that negotiations for fusion with another company had been suspended. These negotiations are now in abeyance, but it is generally supposed in the market that they will be resumed, if they are not already in progress. Speculation has flirted with the name of Philco as the probable second party

(*Continued on page* 323)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price Aug. 31	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies					
Bournemouth and Poole	12½	12½	58/–	..	4 6 2
British Power and Light	6	7	32/–	+6d.	4 7 6
City of London	7	7	27/6	..	5 1 10
Clyde Valley	8	8	39/6	..	4 1 0
County of London	8	8	41/6	+1/–	3 17 0
Edmundsons:					
7% Pref.	7	7	34/–	..	4 2 4
Ord.	6	6	28/6	..	4 4 3
Elec.Dis.Yorkshire	9	9	44/–	..	4 1 10
Elec. Fin. and Securities	12½	12½	52/–	..	4 16 1
Elec. Supply Corporation	10	10	46/–	..	4 7 0
Isle of Thanet	Nil	Nil	17/–	..	—
Lancs. Light and Power	7½	7½	34/6	..	4 7 0
Llanelly Elec.	5½	6	25/6	..	4 14 1
Lond.Assoc.Electric	4	3	24/–	..	2 10 0
London Electric	6	6	26/6	..	4 10 7
London Power Red. Deb.	5	5	104½	..	4 15 7
Metropolitan E.S.	8	8	40/6	+6d.	3 19 0
Midland Counties	8	8	39/6	+1/–	4 1 0
Mid. Elec. Power	9	9	43/–	..	4 3 9
Newcastle Elec.	7	7	31/–	..	4 10 5
North Eastern Elec.:					
Ordinary	7	7	32/–	..	4 7 6
7% Pref.	7	7	34/–	..	4 2 4
Northampton	10	10	47/6	..	4 4 0
Notting Hill 6% Pref. (£10)	6	Nil	10	..	—
Northmet Power:					
Ordinary	7	7	37/6	+1/–	3 14 8
6% Pref.	6	6	30/6	..	3 18 8
Richmond Elec.	6	6	26/–	..	4 12 4
Scottish Power	8	8	38/–	+6d.	4 4 4
Southern Areas	5	5	22/–	..	4 10 11
South London	7	7	26/6	..	5 5 8
West Devon	5	5	23/–	..	4 7 0
West Glos.	4½	3½	23/–	..	3 1 0
Yorkshire Elec.	8	8	40/–	+6d.	4 0 0
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	5/6	..	—
Calcutta Elec.	7*	6*	38/6	..	3 2 4
Cawnpore Elec.	10	10	34/–	..	5 17 8
East African Power	7	7	33/6	..	4 3 7
Jerusalem Elec.	7	5	30/6	+1/–	3 5 7
Kalgoorlie (10/–)	5	5	10/–	..	5 0 0
Madras Elec.	6*	4*	25/-	..	—
Montreal Power	1½	1½	29½	..	5 1 8
Palestine Elec."A"	4*	5*	42/–	..	2 7 8
Perak Hydro-elec.	6	7	10/6	..	—
Shawinigan Power	83cts.	90cts.	19½	..	—
Tokyo Elec. 6%	6	6	22	..	—
Victoria Falls Power	15	15	4 1/16	+1/16	3 9 7
WhitehallInv.Pref.	—	—	25/–	..	4 0 0

Company	Dividend Previous	Dividend Last	Middle Price Aug. 31	Rise or Fall	Yield p.c. £ s. d.
Public Boards					
Central Electricity:					
1955–60 (Civil Defence)	—	3	99½	..	3 0 4
1955–75	5	5	115	..	4 7 0
1951–73	4½	4½	107	..	4 4 1
1963–93	3½	3½	102	..	3 8 8
1974–94	3½	3½	100	..	3 5 0
London Elec. Trans. Ltd.	2½	2½	97	..	2 11 3
London & Home Counties 1955–75	4½	4½	110	..	4 1 10
Lond.Pass.Trans.:					
A	4½	4½	117½	..	3 16 7
B	5	5	115½	..	4 6 7
C	2½	3	67	–1	4 9 7
WestMidlandsJ.E.A. 1948–68	5	5	110	..	4 11 0
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	116	+1	5 3 4
Def.	1½	1½	29	..	5 3 5
Anglo-Portuguese	8	8	24/–	..	6 13 4
Cable & Wireless:					
5½ Pref.	5½	5½	112	..	4 18 4
Ord.	4	4	76	..	5 5 3
CanadianMarconi$1	Nil	4cts.	10/–	..	—
Globe Tel. & Tel.:					
Ord.	8½*	5*	37/–	+1/–	2 14 1
Pref.	6	6	28/6	–6d.	4 4 3
Great Northern Tel. (£10)	Nil	Nil	21½	..	—
Inter. Tel. & Tel.	Nil	Nil	16	–1	—
Marconi-Marine	7½	7½	32/9	..	4 11 7
Oriental Tel. Ord.	16	10	45/6	..	—
Telephone Props.	6	Nil	14/6	..	—
Tele.Rentals (5/–)	10	10	12/–	+1/16	4 3 4
Traction and Transport					
Anglo-Arg. Trans.:					
First Pref. (£5)	Nil	Nil	4/–	..	—
4% Inc.	Nil	Nil	10	..	—
Brit.Elec.Traction:					
Def. Ord.	45	45	1125	+10	4 0 0
Pref. Ord.	8	8	175	..	4 11 5
Bristol Trams	10	10	51/–	..	3 18 6
Brazil Traction	$½	$1	28½	..	—
Calcutta Trams	5½	6½	40/9xd	–1/–	3 3 8
Cape Elec. Trams	5	6	25/6	..	4 14 0
Lancs. Transport	10	10	44/3	..	4 10 4
Mexican Light:					
1st Bonds	5	5	107½	..	4 13 0
Rio 5% Bonds	5	5	105½	..	4 14 9
Southern Rly.:					
5% Prefd.	5	5	76	–1½	6 11 7
5% Pref.	5	5	110½	..	4 10 6
T. Tilling	10	10	55/–	..	3 12 9
West Riding	10	10	43/6	..	4 12 0

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Aug. 31	Rise or Fall	Yield p.c. £	s.	d.
Equipment and Manufacturing							
Aron. Elec. Ord.	7½	10	44/–	+1/6	4	11	0
Assoc. Elec. :							
Ord.	10	10	50/–	+1/–	4	0	0
Pref.	8	8	38/–	..	4	4	3
AutomaticTel.&Tel.	12½	12½	56/3	..	4	9	0
Babcock & Wilcox	11	11	47/–	..	4	13	5
British Aluminium	10	10	49/6	..	4	1	0
British Insul. Ord.	20	20	5½	..	3	12	9
British Thermostat (5/-)	18½	18½	19/–	..	4	17	4
British Vac.Cleaner (5/–)	15	30	27/6	..	5	9	1
Brush Ord. (5/–)	6	8	8/–	–3d.	5	0	0
Burco (5/–)	15	15	14/9	..	5	1	8
Callender's	15	20	5	+1/–	4	0	0
ChlorideElec.Storage	15	15	82/6	..	3	13	0
Cole, E. K. (5/–)	7	10	25/6	+6d.	1	19	3
Consolidated Signal	17	24	5½	+⅛	4	5	3
Cossor, A. C. (5/–)*	7½*	10*	24/–	–6d.	2	1	8
Crabtree (10/–)	17½	17½	38/6	+6d.	4	11	0
Crompton Parkinson Ord. (5/–)	20	20	26/–	..	3	17	0
E.M.I. (10/–)	6	6	27/–	..	2	4	8
Elec.Construction	10	12½	49/6	+2/–	5	0	10
Enfield Cable Ord.	12½	12½	58/6	–6d.	4	5	6
English Electric	10	10	48/–	..	4	3	4
Ensign Lamps (5/–)	25	25	22/6	..	5	11	1
Ericsson Tel. (5/–)	22*	20*	47/6	..	2	2	2
Ever Ready (5/–)	40	40	40/6	–1/6	4	18	9
Falk Stadelmann	7½	7½	31/–	..	4	16	9
Ferranti Pref.	7	7	28/9	..	4	17	5
G.E.C. : Pref.	6½	6½	32/–	..	4	1	3
" Ord.	17½	17½	89/–	..	3	18	8
Greenwood&Batley	15	15	40/–	+1/–	7	10	0
HallTelephone(10/–)	12½	12½	25/3	..	4	19	0
Henley's (5/–)	20	20	25/6	..	3	18	6
4½% Pref.	4½	4½	23/–	..	3	18	3
Hopkinsons	15	17½	63/6	..	5	10	3
India RubberPref.	5½	5½	22/–	..	5	0	0
Intl. Combustion	30	30	6½	..	4	17	10
Johnson & Phillips	15	15	70/–	+6d.	4	5	9
Lancashire Dynamo	20	22½	92/9	..	4	17	0
Laurence,Scott(5/–)	15	12½	12/–	..	5	4	2
London Elec. Wire	7½	7½	31/6	..	4	15	3
Mather & Platt	10	10	51/3	..	3	18	0
Metal Industries (B)	5	8	41/3	..	3	17	6
Met.Elec.Cable Pref.	5½	5½	21/3	..	5	3	6
Murex	20	20	5½	..	3	18	0
Pye Deferred (5/–)	25	25	25/–	..	5	0	0
Revo (10/–)	17½	17½	38/9	..	4	10	3
Reyrolle	12½	12½	70/–	..	3	11	5
Siemens Ord.	7½	7½	33/3	..	4	10	3
Strand Elec. (5/–)	4	7½	7/3	..	5	3	5
Switchgear & Cowans (5/–)	10	20	16/–	..	6	5	0
T.C.C. (10/–)	5	5	18/9	..	2	13	4
T.C. & M.	10	10	52/–	..	3	17	1
TelephoneMfg.(5/–)	9	9	11/9	+3d.	3	16	8
Thorn Elec. (5/–)	20	20	21/9	..	4	12	0
Tube Investments	20	20	92/–	+6d.	4	7	0
Vactric (5/–)	Nil	Nil	13/9	..		—	
Vickers (10/–)	10	10	19/3	..	5	4	0
WalsallConduits(4/-)	55	55	44/3	..	4	19	7
Ward & Goldstone (5/–)	20	20	26/–	..	3	17	0
WestinghouseBrake	10	12½	66/3	+⅛	3	15	6
West, Allen (5/–)	7½	7½	7/6	..	5	0	0

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from page* 321)

to the rumoured amalgamation with Cossor, while more recently the Ever Ready Company was mentioned in a similar connection. Nothing definite has yet transpired. This is the more curious seeing that the talk has been going on for nearly six months. Philco shares gave way somewhat sharply from 13s. to 12s. for no definite reason. One supposition in the market was that the selling of the shares came from the United States, where the Philco company owns various patents and processes in the Philadelphia Storage Battery Company. E.M.I. shares remain steady at 27s.

Electrical Finance Debenture

In the near future there should be a fairly free market in the new 4 per cent. debenture stock recently issued by the Electrical Finance & Securities Co. in exchange for its existing 5½ per cent. debenture. Holders of all but 14 per cent. of the 5½ per cent. stock accepted the offer to convert into the new stock, the first interest payment on which, 42s. 6d. per cent., is due on March 1st, 1944. The interest on the issue will take £11,200 annually and in the last accounts of the company there was £84,900 available to meet it. The issue is redeemable by 1975 by purchase up to, or by drawings at, 100 by means of a cumulative sinking fund that begins in 1947. The company also has the right to pay off the whole issue at 100 after August, 1946. The nominal price is about 102½, but at present the market has hardly developed.

Greenwood & Batley

Greenwood & Batley shares have hardened a trifle, and are not offered under 40s. 6d. in the market. At this, the return on the money is £7 9s. per cent. on the basis of the annual dividend of 15 per cent. paid for the last three consecutive years. The company's trading profit has been consistently steady and the 15 per cent. dividend paid last year came out of earnings of over 26 per cent. The company carries on business as engineers, machinery makers, etc.; it manufactures electric locomotives, turbines, etc., and has an issued capital of £465,000 of which £354,585 is in ordinary shares of £1 each. The balance sheet is a good one and, except for the possibility that the shares may have been overlooked, there seems no good reason why they should be standing at a price that gives such a generous return.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

BRITISH Insulated Cables, Ltd., and J. C. Quayle.—" Guides for the transmission of electric waves." 8694/5. July 10th, 1941. (555194/5.)

British Insulated Cables, Ltd., and E. G. Hargreaves and H. J. Dunkerley (both legal representatives of E. S. Hargreaves), and H. M. Steward.—" Apparatus for marking the surface of an electric cable or similar article." 7733. June 6th, 1942. (555238.)

British Thomson-Houston Co., Ltd.—" Washing machines." 1177/42. January 30th, 1941. (555294.) " Liquid-break electric circuit-breakers incorporating isolating contacts." 1791/42. February 12th, 1941. (555300.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—" Electric motor control systems." 14216. November 4th, 1941. (555198.)

A. M. Carstens.—" Electrically operated gas lighters." 16321/41. December 18th, 1942. (555199.)

E. B. Carter.—" Electric lighter for cigarettes and the like." 8874. June 27th, 1942. (555280.)

J. W. Dalgleish and Pye, Ltd.—" Modulated high frequency carrier wave signalling systems." 4489. April 3rd, 1942. (555232.)

Electric Resistance Furnace Co., Ltd., W. J. Millar and J. A. Monks.—" Installations for the heat treatment of metals and other materials." 16234. November 17th, 1942. (555258.)

English Electric Co., Ltd., and J. Nichol.—" Manufacture of dynamo-electric machines." 6216. May 8th, 1942. (555235.)

Expanded Metal Co., Ltd., and W. de Renzi.—" Electric controllers." 1707. February 9th, 1942. (555274.) " Electric controllers." 9358. February 9th, 1942. (Divided out of 555274.) (555282.)

Foster Transformers & Switchgear, Ltd., and R. G. Lowe.—" Electric circuit-breakers." 181. January 6th, 1942. (555242.)

E. E. Griffiths.—" Thermostatic means for regulating the heat supply to liquid heating apparatus." 1651. February 7th, 1942. (555298.)

Igranic Electric Co., Ltd.—" Switches operated by web-breakage." 12319/42. September 12th, 1941. (555306.)

W. J. Jarrard, M. R. Moritz and H. P. Zade.—" Method and apparatus for plotting equipotential lines and surfaces." 11011. August 28th, 1941. (555196.)

W. G. Jones and Pye, Ltd.—" Manufacture of bases for electric discharge vessels." 752. January 19th, 1942. (555244.)

R. J. Kemp.—" Spaced-frame radio direction finders." 1501. February 4th, 1942. (555206.)

C. G. Lemon and Tenaplas, Ltd.—" Parallel line electrical cables." 3539. March 17th, 1942. (555228.)

London Electric Wire Co. & Smiths, Ltd., and A. B. Ashton.—" Machine for piercing diamonds for use as wire drawing dies." 1891. February 12th, 1942. (555276.)

Marconi Instruments, Ltd., and W. B. Bartley.—" Apparatus for electrically determining the moisture content of granular or powdery materials." 1611. February 6th, 1942. (555211.)

Marconi Instruments, Ltd., W. B. Bartley and C. F. Brockelsby.—" Measuring and controlling the acidity or alkalinity of aqueous solutions." 1610. February 6th, 1942. (555210.)

Marconi's Wireless Telegraph Co., Ltd.—" Modulated carrier-wave communication systems." 1708/42. February 7th, 1941. (555212.) " Television transmitting system." 1827/42. February 11th, 1941. (555213.)

Maschinenfabrik Oerlikon and W. Boller.—" Method of soldering together parts of aluminium." 13207. September 18th, 1942. (555255.)

J. F. O'Brien.—" Electrical wiring systems." 1128. January 27th, 1942. (555217.) " Multiple conductor electric wiring unit." 1129. January 27th, 1942. (555218.) " Electrical wiring systems." 1130. January 27th, 1942. (555219.) " Electrical wiring systems." 11641/43. January 27th, 1942. (Divided out of 555219.) (555239.)

J. Peebles and Glenfield & Kennedy, Ltd.—" Apparatus for cleaning water strainers." 1495. February 4th, 1942. (555271.)

Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken).—" Application of metallic layers to non-metallic surfaces." 1623. February 6th, 1942. (555297.)

J. Southern.—" Centrifugal pumping plant." 13345. September 22nd, 1942. (555256.)

Standard Telephones & Cables, Ltd.—" Electron discharge devices." 4069/42. March 29th, 1941. (555231.) " Thermo-sensitive control circuits for thermionic amplifiers." 9965. July 25th, 1941. (555253.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—" Radiogoniometers." 2592. February 27th, 1942. (555225.)

A. H. Stevens (Electronic Laboratories, Inc.).—" Electromagnetically operated vibrators for producing alternating current." 3621. March 18th, 1942. (555229.)

J. Stone & Co., Ltd., and A. H. Chilton.—" Pile regulators for electric circuits." 344. January 9th, 1942. (555269.)

Westinghouse Electric International Co.—" Systems for supplying and controlling an inductive load particularly applicable to electric resistance welding." 599/42. January 16th, 1941. (555291.)

I.E.E. Western Centre

The inaugural meeting of the Western Centre of the Institution of Electrical Engineers for the forthcoming session has been arranged to take place at Cardiff on October 11th, when the chairman (Mr. H. Coope) is to deliver his address. The provisional programme for the session includes two " Brains Trust " meetings.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Belfast.—September 13th. Electricity Department. Static transformer (Specification No. G.29), and 6·6 kV cable (Specification No. G.30). Specification and forms of tender from the city electrical engineer and manager, East Bridge Street. Tenders to the Acting Town Clerk.

Orders Placed

Acton.—Corporation. Accepted. Switchgear (£363).—Ferguson Pailin. Cable (£250).—Hackbridge Cable Co.

Lanark. — County Council. Accepted. Electrical work at new houses (£2,248).—Neil Thomson. Electrical installation (£385).—D. Henderson & Son.

Northumberland.—County Council. Accepted. Electrical installation at the County Hall canteen, Newcastle (£54).—Gray Brothers.

Peterborough.—Electricity Committee. Accepted. Transformers.—English Electric Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Angus.—Houses (12), Bogindollo Farm, Oathlaw, Maryton and Inverkeilor, for County Agricultural Committee; county architect, County Buildings, Forfar.

Ashford (Kent).—Day nursery; surveyor, Urban Council Offices.

Barnsley.—Building for central kitchen, adjoining Belle Vue Science Centre; H. Taylor, borough surveyor, Town Hall.

Beeston and Stapleford.—Day nursery, Stapleford, for U.D.C.; surveyor, Public Offices, Foster Avenue, Beeston.

Berwick. — Adaptation of premises as maternity home; Grant & Evans, builders, Berwick.

Blyth.—Clinic, Stanley Street; J. Goulding & Son, builders, Blyth.

Bolton.—Dining centre at Pilkington Street Council School; S. Talbot & Sons, builders, Harris Street, Bolton.

Senior School, Tonge Moor, for R.C. authorities; Rev. Fr. C. Chronnell, St. Edmund's Rectory, Bolton.

Works extensions; Harry Peers & Co., Ltd., constructional engineers, Elton Street, Mill Hill.

Cheshire.—District offices, corner of King's Gap and Meols Drive, Hoylake; W. Parkes, county architect, The Castle, Chester.

Clun.—Houses (£7,603), Brockton and Worthen, for R.D.C.; H. Price & Sons, builders, Welsh Bridge, Shrewsbury.

Corsham (Wilts).—Community centre; clerk to Parish Council.

Coventry.—Two prefabricated buildings as extensions to the Junior Technical School (£4,000); D. E. E. Gibson, city architect, 1A, Warwick Row.

Derbyshire.—Building for dining hall, Morley Road School, Chaddesden; J. Harrison, county architect, St. Mary's Gate, Derby.

Devon.—Farm buildings at Duckaller Farm, Dawlish; Small Holdings Officer, Bradninch Hall, Exeter.

Easington.—Schemes for new housing estates prepared by Rural District Council; C. W. Clarke, surveyor, R.D.C. offices, Easington, Co. Durham.

Eccles.—Offices, etc.; Mitchell Shackleton & Co., Ltd., forgemasters, Vulcan Works, Patricroft.

Erith.—Classrooms at Bedonwell Hill School, Belvedere; J. H. Clayton, borough engineer, Council Offices.

Forden.—Farm workers' houses, Forden and Abermule, for R.D.C.; Jones & Leach, Ltd., builders, Llanidloes Road, Newtown, Mont.

Gillingham.—Extension to canteen at Rainham School, Solomon Road; borough engineer, Municipal Buildings.

Hertford.—Cottages (6); deputy clerk to R.D.C., 20, Castle Street, Hertford.

Hexham.—British Restaurant for U.D.C.; W. G. Landale, surveyor, Council Offices, Hexham House.

Heywood.—Dairy at Hurst Farm, Ashworth; J. R. Bridgford & Sons, architects and surveyors, 10, Norfolk Street, Manchester, 2.

Hollinwood.—Fire station and control room, Byrom Street, for N.F.S.; Staff Fire Officer, National Fire Service, Hollinwood, near Oldham.

Hulme.—Additions, Blantyre Street, for the Commercial Plating Co.; J. C. Cookson & Co., Ltd., builders, Unwin Street, Pendleton, Salford.

Kendal.—Farm workers' houses (8); P. A. Baines & Sons (Northern), Ltd., Culgaith.

Leicestershire.—Farm workers' houses, Sanatorium Farm, Markfield; W. Keay, county architect, 6, Millstone Lane, Leicester.

Leigh.—Club headquarters, British Legion Club, Windermere Road, Leigh (£4,000); H. Lyon, president.

Llanelly.—Erection and equipment of kitchen for school children; borough surveyor, Town Hall.

Manchester.—Reinstatement of offices, etc., Bridge Street; David Walton & Co., Ltd., building contractors, Clarendon Road, Cross Lane, Salford, 5.

Melford.—Agricultural workers' houses for R.D.C.; C. Deaves, builder, Colchester Road, Bures, Colchester.

Mildenhall.—Farm workers' houses; C. Bailey & Co., Ltd., builders, 254 & 256, Seven Sisters Road, London, N.4.

Mirfield.—Additions to premises, Battyeford; S. T. Moon & Co., rag pullers, West Mills.

Motherwell.—Houses (£90,000) for Scottish Special Housing Association, Edinburgh; W. McCrea, architect, Glasgow.

Newcastle-on-Tyne.—Wartime nurseries; J. & W. Lowry, 50, Corporation Street, Newcastle-on-Tyne; J. Sutton & Son, Prospect Works, Tinn Street, Gateshead-on-Tyne; and R. M. Chamberlain & Co., Low Fell, Gateshead-on-Tyne.

Northumberland.—Nursery at Forest Hall for the C.C.; county architect, County Hall, Newcastle.

North Westmorland.—Houses (10); R. Reay, builder, Southend Road, Penrith.

Oldham.—Additions to bakery; Gartside's, bakers and confectioners, 355, Ripponden Road, Oldham.

Patricroft.—Works extensions, boiler house, machine workshop, etc.; E. B. Jones & Rawlinson, Ltd., building contractors, Leaf Square, Pendleton, Salford, 6.

Additions to Vulcan Foundry; J. Gerrard & Sons, Ltd., building contractors, Pendlebury Road, Swinton, near Manchester.

Perth.—Dining centre, corner of Cross Street and Pomarium Street, and day nursery at Westbank, for T.C.; R. Adam, town clerk, City Chambers.

Royton.—Control room for N.F.S.; Fire Staff Officer, National Fire Service, Royton, near Oldham.

Salford.—Garages and stores, Leicester Road Council Schools; W. A. Walker, city engineer, Town Hall, Bexley Square, Salford, 3.

Sawbridgeworth.—British Restaurant; N. M. Priestland, clerk to U.D.C., The Forebury, Sawbridgeworth, Herts.

Shipston-on-Stour.—Additions and alterations to Ellen Badger Hospital for R.D.C.; surveyor, Council House.

Stockton-on-Tees.—Sewage disposal works for R.D.C.; surveyor, Rural Council Offices, 20, Finkle Street.

Stretford.—British Restaurant, Trafford Park; E. Parker, borough engineer, Town Hall.

Sunbury-on-Thames.—British Restaurant at Carlton Hall, Staines Road (£970); F. Coyle & Co., Ltd., builders, 61, High Street, Brentford.

Wallsend.—Works canteen; W. T. Weir, Coach Open, Howdon-on-Tyne.

Wirksworth.—Adaptations at 42, St. John's Street, for ante-natal hostel; surveyor, Urban Council Offices.

Wolverhampton.—Church Institute, adjoining Methodist Church, Lichfield Road; church secretary, New Invention Methodist Church, Lichfield Road.

Indian Industrial Aspirations

SPEAKING at the annual meeting of the Bombay Chamber of Commerce (reported in an issue of the *Indian Textile Journal* just received) Mr. J. M. B. Gibbons said that there was a very different atmosphere in India to-day. Trade everywhere was prospering and India, from being a debtor was well on the way to becoming a creditor country. Higher agricultural prices meant more money for the farmer, while the labourer in the towns too was receiving more money. A millhand could buy his whole grain supply, the staple food of four or five adults besides himself, out of his "dearness" allowance alone, and on top of this he had his wages and at times large bonuses as well. If there was anything India needed it was an improvement in the deplorably low standard of living, but unfortunately this extra spending money was being distributed at a time when imports had fallen away to nothing and the supply of consumer goods so urgently needed to improve the standards of the labouring classes was of necessity much curtailed. In consequence the extra money was finding its way into the pockets of "the swarm of profiteers and hoarders that infests India to-day."

This position has no doubt accentuated the demand for the development of indigenous industries and at the annual meeting of the Federation of Indian Chambers of Commerce and Industry Mr. Gaganvihari Mehta, president, declared that the war had revealed serious gaps in the country's industrial structure. Dependence upon imports of plant, etc., had tended to limit the scope and pace of India's industrial advance and was likely to affect adversely the competitive power of the country's industries. The absence of basic machine-making industries handicapped other industries.

At the annual general meeting of the All-India Organisation of Industrial Employers, New Delhi, Mr. Karamchand Thapar, president, appealed to the Government "to change their policy of indifference towards indigenous industries and to prepare themselves and the country for a well-balanced plan of industrialisation which can be put into effect after the termination of the war." He said that in the post-war reconstruction plan regard must be had to the fact that India no longer desired to continue to be an importer of finished articles either from America or Britain. She would much prefer to have her industrial economy adjusted in such a manner as would enable her to manufacture these very articles within her own borders.

That there is indeed no official "indifference" to India's industrial future is shown by a statement in another issue of the journal that the Viceroy has decided to create a new Department of Industries which will deal, among other things, with the development of industries generally. It is also pointed out that whatever justification there may be for the complaint that India's chemical and heavy industries have not received encouragement commensurate with their importance, there can be no doubt that conditions arising from the war have given an unprecedented fillip to industries in India. On the subject of post-war construction in general it is noted that a committee was set up some years ago and, although not much progress has been made, signs are not wanting that the Government does not propose to remain idle.